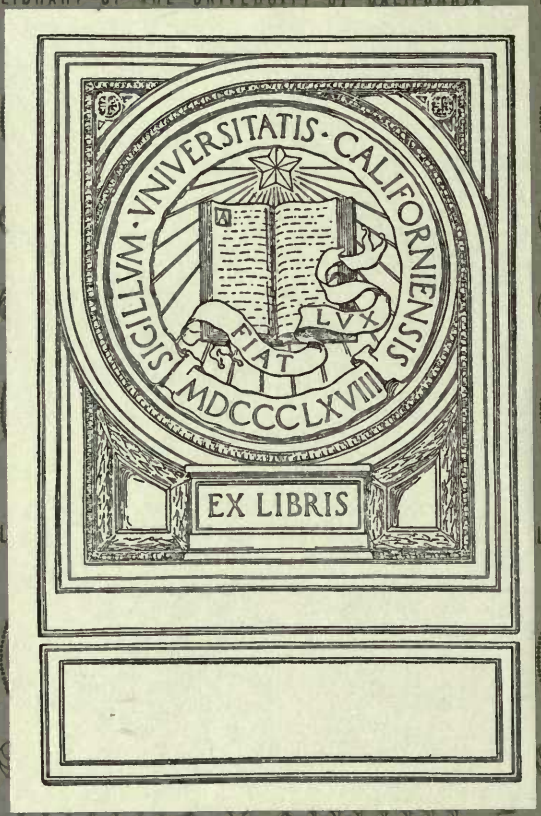
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VOLUME VIII March 25th, 1919

臺灣植物圖譜

臺灣植物誌料

第八卷

Icones Plantarum Formosanarum

nec non et

Contributiones ad Floram Formosanam

or

Icones of the Plants of Formosa, and Materials for a Flora of the Island, based on a Study of the Collections of the Botanical Survey of the Government of Formosa

By

Bunzō Hayata, *Rigakuhakushi*

VOLUME VIII

Published by the Bureau of Productive Industries,

Government of Formosa

TAIHOKU

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II. 1. Conspectus of the Flora of Formosa, Saxifrageæ — Dipsaceæ.

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III. 1. Contributions to the Flora of Formosa, I.

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VI. Contributions to the Flora of Formosa, IV. Published November 25th, 1916.

VII. Contributions to the Flora of Formosa, V. Published March 25th, 1918.

VIII. Contributions to the Flora of Formosa, VI., Published March 25th, 1919.

IX. Will be published in September 1919.

ICONES PLANTARUM FORMOSANARUM

NEC NON ET

CONTRIBUTIONES AD FLORAM FORMOSANAM

VIII

AUCTORE

Bunzō Hayata

TO HIS EXCELLENCY MOTOJIRO AKASHI,

GOVERNOR GENERAL OF FORMOSA.

SIR,

I have the honour to submit to your Excellency the eighth volume of the Icones Plantarum Formosanarum, nec non et Contributiones ad Floram Formosanam by BUNZŌ HAYATA, D. Sc.

HIROSHI SHIMOMURA,

CIVIL GOVERNOR OF FORMOSA.

November 1, 1918, Taihoku.

INTRODUCTION

The present volume contains studies on species and varieties ranging from the Berberideæ down to the Polypodiaceæ. All the species of Phanerogamous plants are here arranged, as in the preceding volumes, after the system of BENTHAM and HOOKER; while those of vascular cryptogams are arranged after the system of ENGLER and PRANTL. Of the species and varieties mentioned in this work, 111 are proposed as new species and 17 are regarded as new varieties of known species. No new genus is proposed, but 4 genera are mentioned as new to the flora of the island. The latter genera are as follows:—

Clematoclethra *Stranvaesia*
Sphaeranthus *Hieracium*

Thus, up to the present date, the total number of species of the flora, so far as is known, is 3458 species and 74 varieties belonging to 1174 genera and 169 families.

Finally, I avail myself of this opportunity to tender my hearty thanks to the officials of the Government of Formosa, to whom I am much indebted for help in the collection of material and in the publication of this work.

B. HAYATA.

October 1918, Taihoku and Tōkyō.

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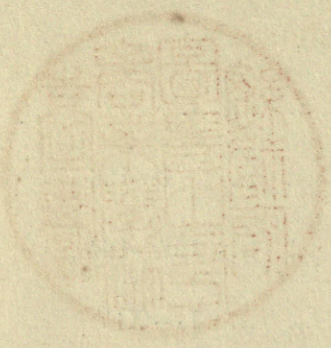

Contributions to the Flora of Formosa.

VI.

Berberideæ.

Stauntonia DC.

Stauntonia formosana HAYATA sp. nov. (Pl. I.)=*Holboellia formosana* Scandentissima et volubilis, rami et ramuli teretes. Folia ad apicem ramuli annotini disposita digitatim 4-foliolata, petiolis communibus 5 cm. longis gracilibus, petiolulis 1½ cm. longis; foliolis subæqualibus, centralibus plus minus majoribus oblanceolatis vel obovato-oblongis 7 cm. longis 2½ cm. latis apice triangulari-acutis basi cuneatis margine integris subtus pallidissimis pinninerviis. Racemi ad basin ramuli hornotini dispositi 7 cm. longi gracillimi, bracteis minutis linearibus 4 mm. longis ½ mm. latis acuminatis glabris, pedicellis gracillimis 1–1½ cm. longis glabris. Fl. ♂: sepala 3 ovato-lanceolata 11 mm. longa 3½ mm. lata apice obtusa basi contracta; petala 3 linearia 11 mm. longa ½–⅔ mm. lata apice obtusa basi contracta minute muricata; columna staminalis 4–5 mm. longa, filamentis subliberis basi connatis 1½–2 mm. longis glabris, antheris distinctis linearibus 2–2½ mm. longis ½ mm. latis apice obtusis, appendiculis nullis. Fl. ♀: sepala 3 ovato-lanceolata 1 cm. longa 3½ mm. lata apice obtusa basi contracta; petala linearia 1 cm. longa ½ mm. lata apice obtusa facie apiceque minute muricata basi contracta; carpella 3 cylindrica 3 mm. longa apice perfecte truncata stigmatifera.

HAB. Keitao, leg. B. HAYATA, Aprili. 1916.

Resembles to some extent *S. chinensis* DC.; but greatly differs from it by the nearly distinct stamens with no apical appendage. The new species is a just intermediate form connecting *Stauntonia* and *Holbœllia*. It is closely related to *Holbœllia* in the free stamens on one hand, while on the other it resembles *Stauntonia* in the acuminate linear sepals.

Note: Flowers pale-green to cream-yellow.

Stauntonia keitaoensis HAYATA sp. nov. (Fig. 1) Scandentissima, rami et ramuli teretes glabri. Folia ad apicem ramuli annotini approximatim 2–3-disposita digitatim 6-foliolata, petiolis communibus 12 cm. longis glabris

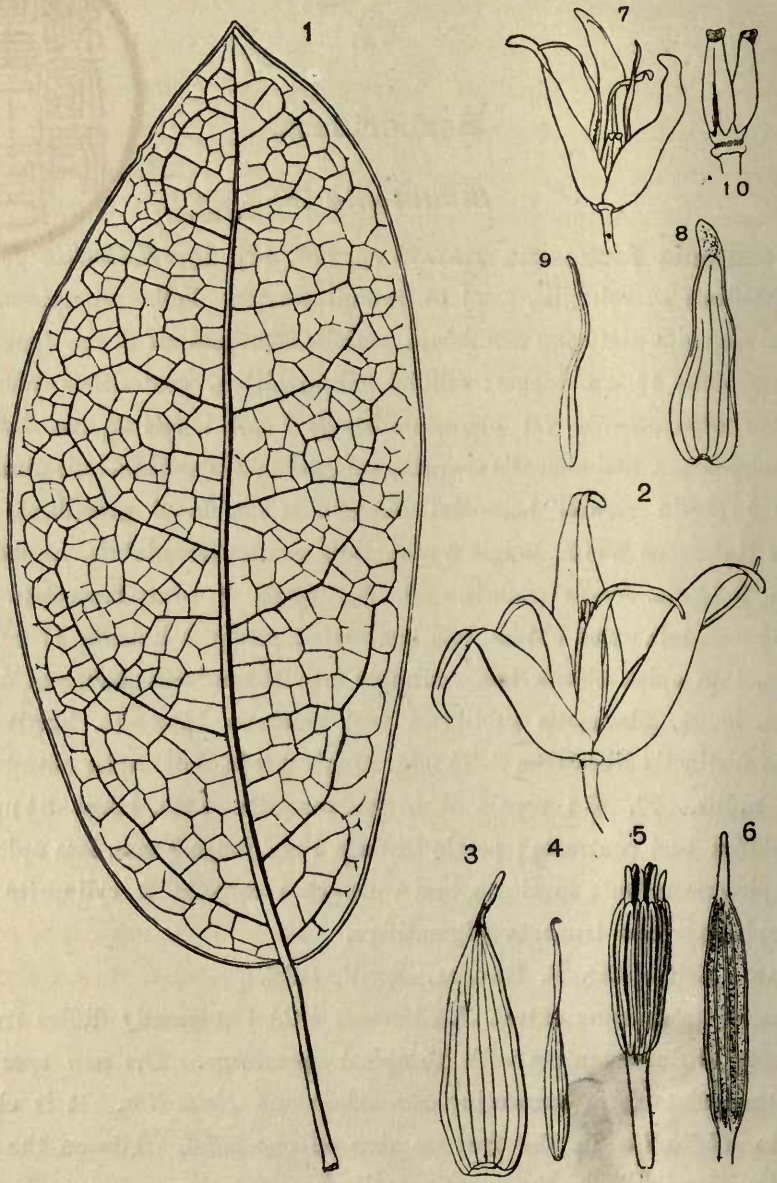

Fig. 1; *Stauntonia keitaoensis* HAYATA; 1, a leaflet; 2, a male flower; 3, a sepal; 4, a petal; 5, staminal column; 6, a stamen; 7, a female flower; 8, a sepal; 9, a petal; 10, ovary.

basi plus minus incrassatis gracilibus, petiolulis 2½ cm. longis; foliolis centralibus majoribus ovato-oblongis plus minus obliquis 12 cm. longis 5½ cm. latis apice abrupte acutis vel cuspidatis ad summum arista callosa instructis basi obtusissimis vel rotundatis margine integris utraque glabris subtus glaucis, venis venulisque supra impressis subtus elevatis; foliolis lateralibus basilaribusque minoribus obliquissimis dimidium folioli centralis in longitudine æquantibus. Racemi ad basin ramuli hornotini ad axillas cataphyllarum dispositi, cataphyllis spathulatis 2 cm. longis 5–8 mm. latis apice rotundatis basi attenuatis; racemi pauce ramosi graciles glabri, bracteis linearibus 5–6 mm. longis, pedicellis 1 cm. longis. Fl. ♂ : sepala 3 ovato-lanceolata 2 cm. longa 7 mm. lata apice obtusa basi plus minus contracta; petala 3 anguste linearia 2 cm. longa 1½ mm. lata apice obtusa basi obtusa; columna staminalis 10 mm. longa 2 mm. lata, filamentis toto connatis 3 mm. longis glabris, antheris connatis linearibus 4 mm. longis 1 mm. latis apice appendiculatis, appendiculis linearibus 2 mm. longis acuminatis liberis; rudimentum carpellorum 3 lineari-acuminatum 1½ mm. longum. Fl. ♀ : sepala ovato-oblonga 12 mm. longa 4 mm. lata apice obtusissima basi contracta; petala linearia 11 mm. longa 1mm. lata apice acuta; carpella 3 lineari-cylindrica 3–4 mm. longa glabra apice stigmatifera.

Hab. inter Keitao et Goshōrin, leg. B. Hayata, Aprili. 1916.

Near *Stauntonia hexaphylla* Decne.; but differs from it in having leaves glaucous on the under side.

Note: Flowers cream-yellow to white; flower-buds green; ovary green.

Stauntonia hebandra Hayata sp. nov. (Fig. 2). Scandentissima, rami et ramuli teretes cinerascentes. Folia ad basin ramuli annotini 2–3-disposita digitatim 5-foliolata, petiolis communibus 8–9 cm. longis glabris gracilibus; foliolis centralibus majoribus ellipticis 9 cm. longis 5½ cm. latis apice rotundatis vel tenuissime emarginatis basi rotundatis margine integris supa glabris subtus pallidissimis plus minus glaucescentibus tenuiter coriaceis; petiolulis 2½ cm. longis; foliolis lateralibus vel basilaribus plus minus minoribus obscure trinerviis. Racemi e basi ramuli hornotini oriundi 4–5 cm. longi gracillimi glabri, bracteis minutis vel obsoletis, pedicellis gracillimis 4–5 mm. longis. Fl. ♂ : sepala 3 ovato-lanceolata 1 cm. longa 3½ mm. lata apice obtusa basi contracta; petala linearia 9 mm. longa ½ mm. lata apice obtusissima; stami-

nalis columna 4 mm. longa $1\frac{1}{2}$ mm. lata, filamentis toto connatis 2 mm. longis glabris, antheris connatis vel subliberis linearibus vel oblongis $1\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis apice obtusissimis vel interdum emarginatis, appendiculis nullis; rudimenta carpellorum minuta $3\frac{1}{2}$ mm. longa linearia. Fl. ♀: ignoti.

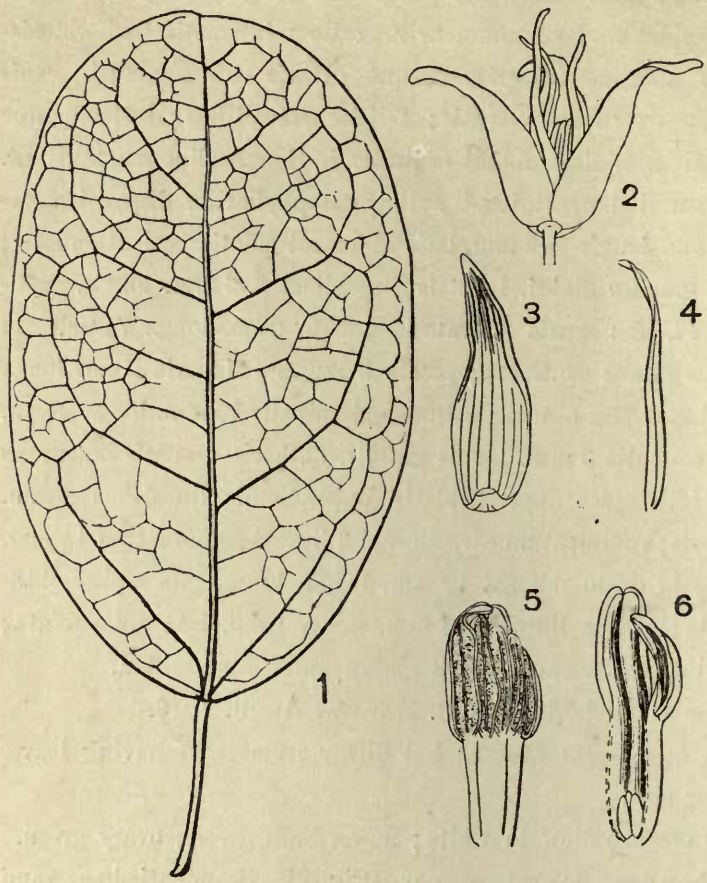

Fig. 2; *Stauntonia hebandra* HAYATA; 1, a leaf; 2, a male flower; 3, a sepal; 4, a petal; 5, staminal column; 6, the same in vertical section, rudimental ovary seen.

HAB. Karapin et Funkiko, leg. B. HAYATA, 1912 Mart.

Near *Stauntonia obovata* HEMSL. in the leaves; but differs from it in having quite obtuse or even emarginate anthers.

Stauntonia obovatifoliola HAYATA sp. nov. (Fig. 3, 1–6). Scandentissima et volubilis, rami et ramuli teretes. Folia ad ramulos hornotinos longissimos alternatim remoteque disposita digitatim 3–5-foliolata, petiolis communibus 3 cm. longis basi incrassatis; petiolulis centralibus $1\frac{1}{2}$ cm. longis, lateralibus brevioribus 1 cm. longis; foliolis centralibus majoribus obovatis 6 cm. longis 4 cm. latis apice subito breve caudatis, (cauda 3–5 mm. longa apice obtusissima sed ad centrum breve aristata vel mucronata), basi obtusissimis vel rotundatis margine

integris obscure trinerviis, venis venulisque supra tenuiter elevatis subtus prominente elevatis supra nitidis subtus pallidis sed haud glaucis. Racemi ad basin ramuli hornotini vel ad axillas foliorum hornotinorum dispositi. Fl. ♀: sepala 3 ovato-lanceolata 2 cm. longa 7 mm. lata apice obtusa basi plus minus contracta; petala 3 lineari-lanceolata 18 mm. longa 3 mm. lata; carpella 3 cylindrica plus minus interiore recurva 3 mm. longa, stigmatibus sessilibus oblongis 1 mm. longis facie ventrali profunde sulcatis.

Hab. Nantō: Kwannondaki, leg. S. Fujii, Mart. 1913.

Differs from *S. hexaphylla* Decne by the obovate or oblanceolate leaves, usually with a cuspidate tip.

Note: Sepals pale cream-green outside, but reddish inside.

Stauntonia obovatifoliola Hayata var. **pinninervis** Hayata n. v. (Fig. 3, 7–13). Foliola obovato-oblonga apice breve caudata (cauda apice obtusa mucronata) basi truncata vel rotundata margine integra 7–8 cm. longa $2\frac{1}{2}$–3 cm. lata, venis venulisque supra tenuiter elevatis subtus prominente

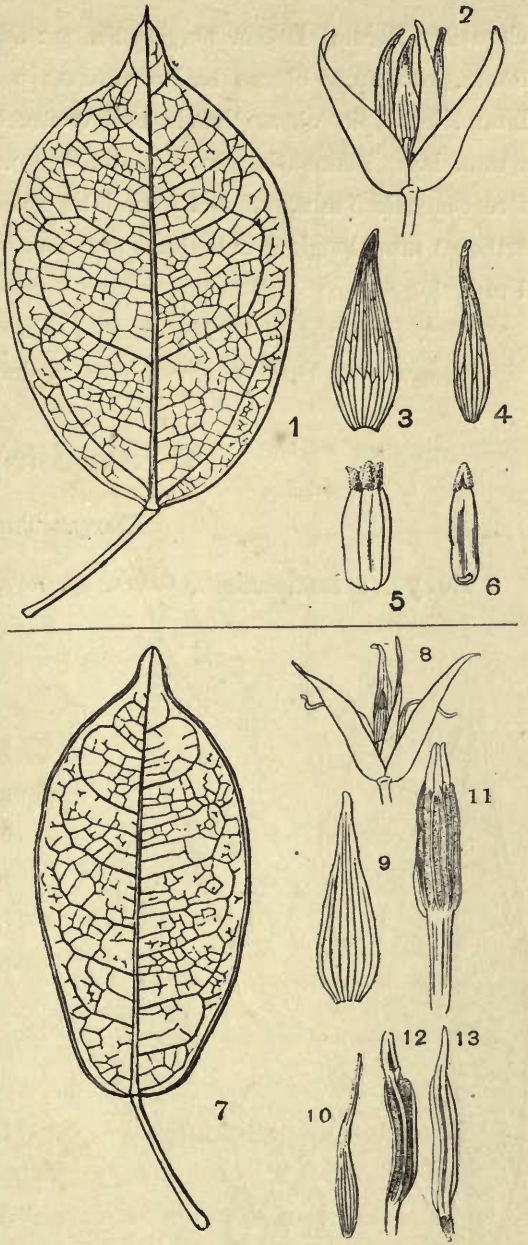

Fig. 3; *Stauntonia obovatifoliola* Hayata; 1, a leaflet; 2, a female flower; 3, a sepal; 4, a petal; 5, ovary; 6, a carpel; 7, a leaflet of the var. *pinninervis* Hayata; 8, a male flower; 9, a sepal; 10, a petal; 11, staminal column; 12, a stamen seen from without; 13, the same, seen from within.

elevatis. Racemi 10 cm. longi. Fl. ♂ : sepala 3 ovato-lanceolata 2 cm. longa 6 mm. lata apice obtusa basi contracta ; petala 3 lineari-lanceolata 2 cm. longa 2 mm. lata apice obtusa laevia basi contracta ; columna staminalis 1 cm. longa 2 mm. lata, filamentis toto connatis 4 mm. longis glabris, antheris linearibus fere connatis 5 mm. longis 1 mm. latis apice appendiculatis, appendiculis linearibus 1 mm. longis $\frac{1}{4}$ mm. latis acuminatis ; rudimenta carpellorum linearia 1 mm. longa.

Hab. Keitao, leg. B. Hayata, ad 4000 ped. alt. Aprili. 1916.

Differs from the type by the more elongate leaves with pinnate veins.

Ternstrœmiaceæ.

Eurya Thunb.

Eurya arisanensis Hayata sp. nov. (Fig. 4). Arborescens. Rami et ramuli cinerascentes vel rubescentes graciles. Folia alterna lanceolata vel oblanceolata 6–8 cm. longa 1–2 cm. lata apice acuminata vel attenuato-acuminata ad summum obtusa basi obtusa vel cuneato-obtusa margine minute serrulata coriacea, costa supra impressa subtus prominenti, utraque pagine glabra sed subtus ad costam tenuissime hirsuta vel glabra, petiolis 5 mm. longis. Racemi axillares 7–8 mm. longi solitarii, pedicellis 1 mm. longis minute pubescentibus apice bracteis 2–3 instructis. Fl. ♂ : sepala 5 inaequalia, interiora majora rotundata circ. 2 mm. in diametro apice plus minus mucronata margine ciliolata dorso minus pubescentia ; petala 5 basi plus minus connata obovato-

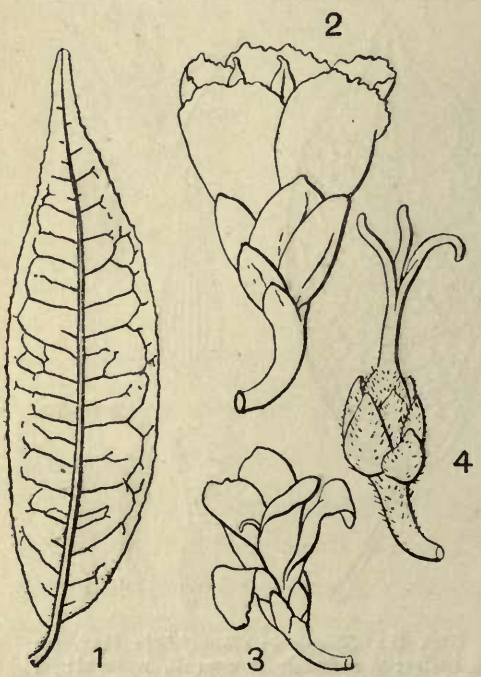

Fig. 4 ; *Eurya arisanensis* Hayata ; 1, a leaf ; 2, a male flower ; 3, a female flower, 4, a young fruit.

oblonga 4 mm. longa $2\frac{1}{2}$ mm. lata apice rotundata vel tenuiter emarginata basi plus minus angustiora margine minutissime crenulato-denticulata; stamina circ. 10, filamentis cum petalis fere toto connatis glabris $1\frac{1}{2}$ mm. longis, antheris ovato-lanceolatis $1\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis apice cuspidato-acutis basi lobatis; rudimentum ovarii elongato-conicum apice acuminatissimum. Fl. ♀: sepala maris; petala 5 basi plus minus connata obovato-oblonga $2\frac{1}{2}$ mm. longa $1\frac{1}{2}$ mm. lata apice obtusissima margine crenulata; ovarium ovoideum 1 mm. longum totiusque latum apice ad stylum abeuns plus minus hirsutum, stylo 2 mm. longo glabro a medio sursum 3–4-fido, ramis gracillimis recurvatis.

Hab. Arisan, leg. B. Hayata, Jan. 1912; et leg. U. Faurie, (No. 1327 typus).

Near *E. gnaphalocarpa* Hayata; but differs from it in the shape of leaves and flowers given in the accompanying figures.

Eurya gnaphalocarpa Hayata sp. nov. (Fig. 5). Arborescens. Ramuli cinerascentes plus minus hirsuti. Folia coriacea oblongo-lanceolata vel oblongo-oblanceolata 6 cm. longa 2 cm. lata apice acuminata sed ad summum obtusa truncata vel retusa basi cuneata acuta margine a medio sursum serrulata basi integra, supra glabra subtus tenuiter hirsuta, petiolis 5 mm. longis hirsutis. Flores ad axillas vel ad latus ramulorum dispositi. Flores ♂: pedicellis 3 mm. longis hirsutis apice bracteis minutis 1–2 instructis, bracteis triangularibus $\frac{1}{2}$ mm. longis ciliolatis; sepala 5 inæqualia, interiora majora triangulari-rotundata 2 mm. longa totiusque lata apice rotundata apice mucronata vel haud mucronata basi leviter contracta margine minute cilio-

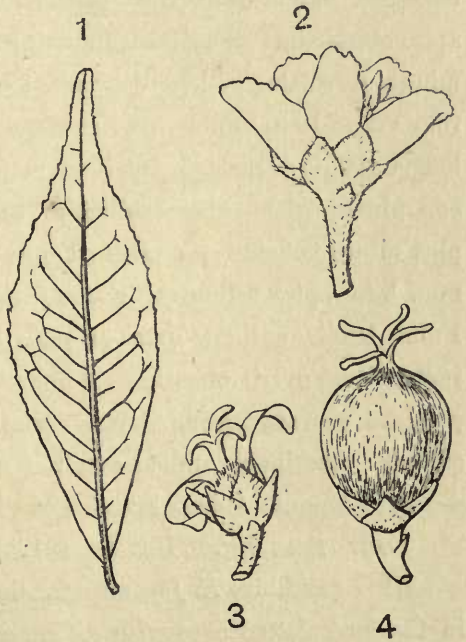

Fig. 5; *Eurya gnaphalocarpa* Hayata; 1, a leaf; 2, a male flower; 3, a female flower; 4, a fruit.

lata dorso medio plus minus pubescentia basi plus minus connata; petala 5 oblonga 4 mm. longa 2–2½ mm. lata apice rotundata leviter emarginata basi plus minus contracta glabra basi plus minus connata; stamina 10–15; rudimentum ovarii subconicum longe hirsutum. Fl. ♀: sepala maris; petala oblonga lineari-oblonga 2½ mm. longa 1 mm. lata apice rotundata emarginata basi plus minus contracta glabra toto distincta; stamina obsoleta; ovarium obovoideum 1½ mm. longum 1 mm. latum dense villosum, stylo columniformi glabro 2 mm. longo a medio sursum 4-fido, ramis gracilibus recurvatis glabris; fructus globosus 2½ mm. in diametro dense hirsutus. Semina scobiformia ½ mm. longa et lata rubescentia.

Hab. Mt. Morrison, Musha—Hōgō, leg. B. Hayata, Aprili. 1916; inter Taroyen et Heishana, Rankanzan.

Near *E. distichophylla* in the hirsute carpels; but differs from it in the cuneate lanceolate leaves.

Eurya glaberrima Hayata sp. nov. (Fig. 6). Arborescens; ramuli cinerascentes. Folia glaberrima coriacea lineari-lanceolata 8 cm. longa 2 cm. lata apice obtusissima ad centrum summorum retusa basi cuneata vel acuta margine minute serrulata, petiolis 7–8 mm. longis glaberrimis. Flores ad axillas foliorum vel ad latus ramulorum 3–4-aggregatim dispositi. Fl. ♂: pedicellis 2 mm. longis glabris; sepala 5, interiora majora rotundata 2½ mm. in diametro apice emarginata glabra haud ciliolata basi plus minus contracta; petala 5 basi plus minus connata patentissima rotundata obovato-oblonga 3 mm. longa 2½ mm. lata apice rotundata glabra; stamina circ. 10 glabra, filamentis glabris 1 mm. longis, antheris ovato-oblongis ⅔ mm. longis ⅓ mm. latis apice obtusis; rudimentum ovarii obconicum ⅔ mm. longum glabrum. Fl. ♀: sepala maris; petala 5 obovata 2½ mm. longa 2 mm. lata apice emarginata basi plus minus cuneata; staminodia nulla; ovarium glabrum depresso-conico-globosum ⅔ mm. —1 mm. longum 1 mm. latum, stylo brevissimo ¼ mm. longo 3-fido.

Hab. Arisan, leg. B. Hayata, 1912; Gōkwanzan, leg. B. Hayata, Aprili. 1916.

This resembles *E. japonica* Th. in the glabrous leaves; but differs from it in the lanceolate leaves with different venation; also related to *E. arisanensis* from which this is distinguishable by the very obtuse or even emarginate tip of the leaves.

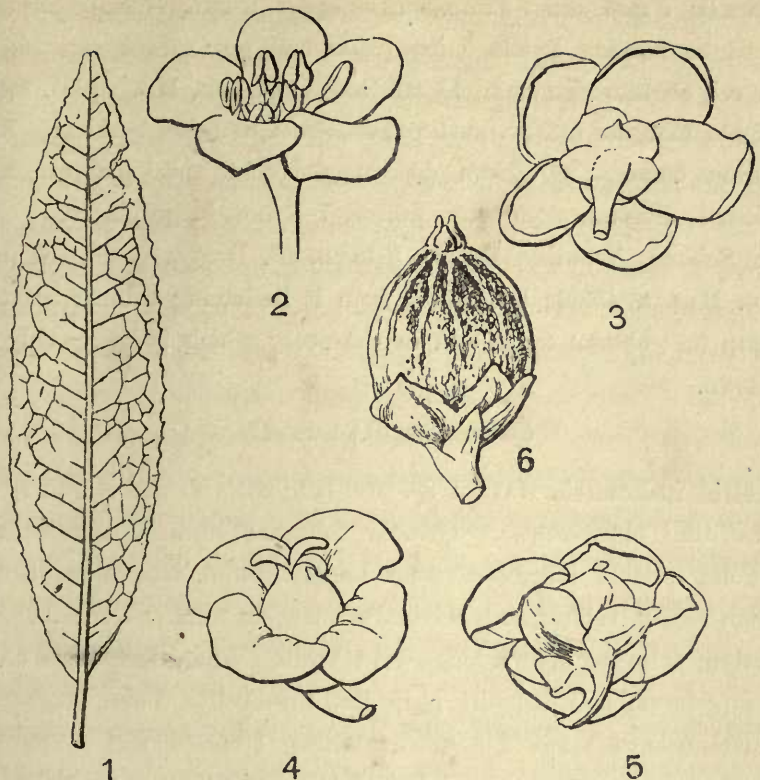

Fig. 6; *Eurya glaberrima* HAYATA; 1, a leaf; 2, a male flower; 3, the same, seen from back; 4, a female flower; 5, the same, seen from back.

NOTE: Fl. ♀: sepals purple, ovary pale green, style and stigma purple.

Schima REINW.

Schima kankaoensis HAYATA sp. nov. *Schima Noronhae* HAYATA Gen. Ind. Fl. Formos. p. 8 (non REINW.) pro parte. Arbor? Rami fuscentes lenticellis minutis notati. Folia ad apicem ramorum approximatim alternatimque disposita chartacea vel chartacco-membranacea oblonga 8 cm. longa 3 cm. lata apice cuspidato-acuminata ad summum aristata basi acuta vel obtusa margine subintegra vel remote aristato-serrata utraque glabra subtus glaucissima, petiolis 1–2 cm. longis. Flores ad axillas foliorum apicalum solitarii, pedicellis 6–7 mm. longis leviter pubescentibus. Calyx late obconicus 5-lobatus, lobis

late rotundatis 5 mm. latis 3 mm. longis apice truncato-rotundatis margine ciliatis basi contractis. Petala 5 inaequalia basi plus minus connata, majora rotundata vel obovato-rotundata $1\frac{1}{2}$ cm. longa 13 mm. lata apice rotundata basi contracta margine integra medio crassiuscula margine tenuiora. Stamina ∞ plus minus connata. Ovarium depresso-globosum apice glabrum a medio deorsum dense villosum, stylo columniformi 7–8 mm. longo glabro.

Near *Schima Noronhae* Reinw. (Benth. Fl. Hongk. p. 29; *S. javanica* Hook. Bot. Mag. t. 4539); but differs from it in having thinner leaves with a few sharp (not obtuse) teeth, and in the ovary which is hairy only at its midway down.

Camellia (L.) Sweet*

Camellia nokoensis Hayata sp. nov. (Pl. II.). Frutex; rami et ramuli teretes gracillimi cinerescentes. Gemma foliorum linearis acuminata dense villosa. Folia coriacea lanceolata 5 cm. longa 13 mm. lata apice acuminata ad summum obtusa vel retusa basi cuneata margine minute serrulata utraque-pagine glabra, petiolis 1–2 mm. longis vel interdum subnullis. Flores ad axillas foliorum superiorum 2–3 dispositi pedicellati, pedicellis 5 mm. longis glabris cernuis incrassatis, bracteis 2–3 triangularibus 1 mm. longis acutis. Sepala 5 persistentia triangularia 2 mm. longa glabra. Petala 6–7 basi plus minus connata, exteriora minora rotundata 6 mm. in diametro glabra margine ciliolata, interiora obovato-rotundata 10 mm. longa 8–9 mm. lata apice rotundata vel emarginata margine minute ciliolata basi contracta. Stamina ∞ glabra, filamentis basi plus minus connatis 7–10 mm. longis apice hirsutis, antheris

* In taking *Camellia* as a generic name, I am following Mr. C. P. Stuart who expressed his opinion in his "Voorbereinde onderzoekingen ten dienste van de selekte der theeplant." To resume his opinion as to the question whether *Camellia* or *Thea* should stand for a generic name, as he wrote me, — "since the scientific world has universally adopted the combination of *Camellia* and *Thea* into one genus, there has been a great deal of controversy as to which name ought to be chosen, because the fundamental work on nomenclature, Linnaeus' Spec. Plant. ed. I. (1753), contained both. French and German botanists have preferred *Thea*, because Kæmpfer used it as early as 1712, but modern nomenclature rules reject this authority, whereas British authers have referred to Linnaeus' book, where *Thea* was wrongly, *Camellia* correctly defined. Moreover, it has been decided by the aforesaid international rules that in case of combination of two groups, the author has the right to choose the name of the united group. Now, in our case, Sweet (1818) was the first author who united *Camellia* and *Thea*, and he applied the first name to the united genus. So there is not the least doubt that *Camellia* is the correct generic name."

cordatis 1½ mm. longis apice apiculatis. Ovarium oblongum glabrum, stylo 1 cm. longo glabro apice 3-fido. *Thea nokoensis* HAY. in Herb. Taihoku.

HAB. Nōkōzan, ad 8000 ped. alt., leg. R. KANEHIRA, Y. SHIMADA et S. SASAKI, Mart. 1918, (No. 63).

Near *Thea transarisanensis* HAYATA, but differs from it in having pedicellate noding flowers with quite glabrous sepals and petals.

Camellia transnokoensis HAYATA sp. nov. Frutex, rami et ramuli gracillimi cinerascentes; gemma foliorum acuminata glabra. Folia oblonga oblongo-lanceolata 3–4 cm. longa 1½ cm. lata apice acuminata ad summum obtusa et retusa basi obtusa vel cuneata margine serrulata coriacea utraque glabra. Flores ad ramulos subterminales sessiles, bracteis 3–4 triangularibus gradatim ad sepala abeuntibus. Sepala 5 persistentia rotundato-triangularia margine hirsuta 3 mm. longa totiusque lata glabra. Petala 5 glabra rotundata 5 mm. in diametro. Stamina ∞. Ovarium subglobosum 1 mm. longum glabrum, stylo 3 mm. longo glabro apice 3-fido. *Thea transnokoensis* HAY. in Herb. Taihoku.

HAB. Nōkōzan, ad 8000 ped. alt., leg. R. KANEHIRA, Y. SHIMADA et S. SASAKI, Mart. 1918 (No. 48).

Near *Thea nokoensis* HAYATA, but differs from it in having quite sessile flowers and in the quite glabrous leaf-buds.

Camellia oleifera ABEL, "Narr. Journ. China, 363, p. 174."

Thea oleifera REHDER et WILSON in Plantæ Wilsonianæ Vol. II.—2, p. 393.

Thea biflora HAYATA Gen. Ind. p. 8.

Camellia hozanensis HAYATA n.n.

Thea hozanensis HAYATA Ic. Pl. Formos. VII. p. 2.

Camellia Nakaii HAYATA n.n.

Thea Nakaii HAYATA Ic. Pl. Formos. VII. p. 3.

Dilleniaceæ.

Actinidia LINDL.

Actinidia arisanensis HAYATA sp. nov. Scandentissima, ramis teretibus lenticellis minutis multo notatis, ramulis hornotinis gracilibus apice approxi-

matim foliiferis. Folia alterna oblonga vel oblongo-rotundata 7½ cm. longa 5 cm. lata apice breve cuspidato-acuta basi obtusa rotundata margine serrulata, serrulis 1 mm. longis a se 3 mm. remotis, supra glabra subtus primum floccosa demum glabra subtus pallida chartacea, petiolis 1–2 cm. longis glabris. Sepala 5 oblonga 4 mm. longa 2 mm. lata apice rotundata basi haud vel vix contracta dorso glabra margine pubescentia. Petala 5 oblongo-obovata vel oblanceolata 7 mm. longa 3 mm. lata apice rotundata basi cuneato-contracta. Stamina ∞, filamentis glabris filiformibus, antheris oblongis 1⅓ mm. longis ⅔ mm. latis apice obtusis basi 2-lobatis. Ovarium globosum dense tomentosum 2 mm. in diametro; stylis circ. 20 filiformibus 4 mm. longis apice oblique clavatis.

Hab. Arisan, inter Taroyen et Heishana, leg. B. Hayata, Aprili. 1912.

Differs from *A. rankanensis* by the leaves which are nearly obtuse or slightly cuneate at the base. In *A. rankanensis*, the leaves are very cuneate at the base.

Note: Flowers yellowish white, but reddish at the base of the petals and sepals.

Actinidia formosana Hayata n. n. *Actinidia callosa* Lindl. var. *formosana* Finet et Gagn.; Hayata Gen. Ind. Fl. Formos. p. 8. Scandentissima Folia versus apicem ramuli hornotini alternatim disposita oblonga elliptica vel ovato-oblonga 10–11 cm. longa 5–6 cm. lata apice cuspidato-acuminata basi obtusissima vel rotundata chartacea margine remote serrulata, serrulis a se 5 mm. remotis aristiformibus 1 mm. longis recurvis, utraque pagine glabra concolora, petiolis 3–5 cm. longis. Cymæ ad axillas foliorum inferiorum dispositæ 5 cm. longæ versus apicem ramosæ 10–15-floratæ dense pubescentes, pedicellis 7–8 mm. longis, bracteis minutis linearibus tomentosis. Sepala 5 plus minus connata oblonga 5 mm. longa 3 mm. lata apice obtusa basi plus minus angustiora connata extus dense intus laxe pubescentia. Petala 5 obovata 7 mm. longa 4 mm. lata apice rotundata basi angustiora glabra. Stamina ∞, filamentis distinctis glabris filiformibus, antheris oblongo-ovatis 1½ mm. longis ⅔ mm. latis apice acutis basi profunde cordatis. Rudimentum ovarii dense tomentosum. Fructus obovoideus 3 cm. longus 18 mm. latus dense verrucosus.

Hab. Kelung, leg. S. Sōma, (typus!); Ōchōbi, leg. B. Hayata. Mai. 1916; Daiton, leg. U. Faurie; Sōzan, leg. Y. Shimada.

This differs from *A. callosa* LINDL. specificially in the obovoid fruits.

NOTE: Leaves dark-green, shining above; petals purple towards the base, but white towards the tip; pith partly lamellate, partly solid.

Actinidia rankanensis HAYATA sp. nov. Scandentissima, rami et ramuli gracillimi. Folia alterna secus ramulos hornotinos disposita obovato-oblonga 6 cm. longa 2½ cm. lata apice subito acuminata basi cuneata chartacea margine arguto-serrulata, serrulis minutis aristiformibus 1 mm. longis a se 3–4 mm. remotis, versus basin integra apice ad summum arista callosa instructa, petiolis 5–10 mm. longis. Cymæ 3–4-floratæ axillares vel versus basin ramulorum foliiferorum dispositæ graciles glabræ, bracteis minutis, pedicellis 5–10 mm. longis. Sepala 5 subæqualia oblonga subglabra 3 mm. longa 2 mm. lata apice obtusa basi plus minus contracta margine integra ciliata vel versus marginem pubescentia basi plus minus connata. Petala 5 obovata 7 mm. longa 3½ mm. lata apice rotundata basi angustiora integra. Stamina circ. 20, filamentis distinctis filiformibus 5 mm. longis glabris, antheris oblongo-ovatis 1½ mm. longis ⅔ mm. latis apice acutis basi profunde cordatis. Rudimentum ovarii ovoideum 2 mm. longum, stylis ½ mm. longis 10–15 distinctis radiatim patentibus.

HAB. Rankanzan, leg. B. HAYATA, Mai. 1916.

Near *A. callosa*, but differs from it by the obovate-cuneate leaves and in the nearly glabrous sepals.

NOTE: Leaves perfectly glabrous, dark-green shining above; sepals light cream-red; rudimental ovary yellow.

Actinidia remoganensis HAYATA sp. nov. Scandentissima. Folia versus apicem ramuli hornotini alternatim disposita oblonga vel obovato-oblonga 9–10 cm. longa 4½ cm. lata apice breve cuspidato-acuta basi obtusissima rotundata margine subintegra vel remote aristulis 1 mm. longis a se 5 mm. distantibus instructa utraque glabra subtus pallidissima chartacea, petiolis 2–2½ cm. longis glabris. Sepala 5 oblonga 3½ mm. longa 2½ mm. lata apice rotundata glabra margine plus minus pubescentia. Petala spathulata 6½ mm. longa 2½ mm. lata apice rotundata basi subcuneata glabra. Stamina circ. 20, antheris oblongis 1½ mm. longis 1 mm. latis apice obtusis emarginatis basi 2-lobulatis. Rudimentum ovarii ovoideum dense tomentosum.

HAB. Remogan, leg. B. HAYATA, Mai. 1916.

Near *A. rankanensis*, but distinguishable from it in the less serrulate or nearly entire leaves and in the narrower petals.

NOTE: Leaves dark-green shining above; sepals very slightly purple; petals white.

Clematoclethra MAXIM.

Clematoclethra sp. HAB. Shichiseitonzan, leg. T. SŌMA, 1912.

The fruits are very much like those of *Clematoclethra*; but the specimen being too imperfect, the exact determination is impossible.

Rutaceæ.

Glycosmis CORREA.

Glycosmis erythrocarpa HAYATA n. n. *Citrus erythrocarpa* HAYATA Ic. Pl. Formos. VI. p. 13.

Near *G. pentaphylla* DC.; but differs from it in the much smaller leaflets which are usually ternate, the lateral ones being nearly opposite.

Murraya LINN.

Murraya Kœnigii SPRENG; HAYATA Gen. Ind. Fl. Formos. p. 12.

Murraya euchrestifolia HAYATA Ic. Pl. Formos. VI. p. 11.

Citrus LINN.*

Citrus medica LINN.; SWINGLE in BAILEY Stand. Cycl. Hort. p. 781 fig. 971.

Citrus medica LINN. subsp. *genuina* ENGL.; HAYATA Gen. Ind. p. 11.

HAB. Shintiku cult.

NOM. JAP. *Maru-Busshukan* 圓佛手柑, 枸櫞.

Citrus medica LINN. var. **sarcodactylis** SWINGLE in BAILEY Stand. Cycl. Hort. p. 781, fig. 793. Frutex 2½ m. altus 4 m. latus. Rami valde divaricati validissimi plus minus inclinati generaliter longissimi. Flores axillares brevissime racemosi vel subglomerati, pedicellis 1–2 mm. longis glabris. Calyx obconicus 1 cm. longus 9 mm. latus apice 5-lobatus, lobis late triangularibus brevissimis 4 mm. latis 1 mm. longis acutis. Petala extus rubro-

* I am much indebted to Mr. Y. TAMURA for his kind informations on this group of plants.

violascentia intus alba oblanceolato-linearia 23 mm. longa 8 mm. lata incrassata apice obtusa basi haud contracta. Stamina circ. 30, filamentis hirsutis plus minus connatis, antheris linearibus 6½ mm. longis 1⅕ mm. latis apice truncatis sed ad summum apiculatis basi 2-lobatis. Discus haud visus. Ovarium in abortu depressum, stylo breve colum niformi ; stigma digitato-fissum, segmentis connatum.

Citrus medica Linn. var. *digitata* Riss. ; Hayata l.c. p. 11.

Nom. Jap. *Busshukan* 佛手柑.

Hab. Shintiku (cult.), leg. B. Hayata, Aprili. 1915.

Note : Colour on the outer side of the petals is like that of No. 553, c. in Klin. et Val. Cod. Coul.*

Citrus Limonia Osbeck ; Swingle l.c. p. 781.

Citrus medica Linn. subsp. *Limonum* Hook f. ; Hayata Gen. Ind. p. 11.

Hab. Shirin, cult.

Nom. Jap. *Lemon* 檸檬.

Citrus gaoganensis Hayata sp. nov. Frutex, ramulis complanato-triquetris 5 mm. latis, spinis ad axillas 4 mm. longis instructis. Folia oblonga 7–10 cm. longa 3–5½ cm. lata basi cuneata vel obtusissima apice triangulari-obtusa ad summum retusa margine subintegra vel tenuissime crenata, petiolis brevioribus 5–6 mm. longis. Flores axillares solitarii, pedicellis 5 mm. longis. Calyx late cupuliformis subinteger. Petala 5 linearia 2 cm. longa 4 mm. lata apice obtusissima ad basin 2–3 mm. lata extus plus minus purpurascentia intus albicantia. Stamina circ. 30 basi usque ad medium connata, antheris oblongo-linearibus. Ovarium oblongum 2–3 mm. longum, stylo columnari 8 mm. longo, stigmate globoso ; discus cupuliformis 3 mm. in diametro. Fructus ellipsoideus 4–5 cm. longus 4–4½ cm. latus apice tenuissime apiculatus, pericarpio tenuissimo 2 mm. crasso flavescenti, 9–10-locularis ; medulla solida tenui, carnibus dulcibus.

Hab. Gaogan, sponte crescens.

Nom. Jap. *Seiban-Lemon.*

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* Klincksieck et Valette :—Code des Couleurs à l' Usage des Naturalistes, Artistes, Commerçants et Industriels, 720 Échantillons des Couleurs, classés d'après la Méthode Chevreul simplifiée, (Paris), 1908.

Near *Citrus Limonia* Osbeck, but distinguishable from it in the more rounded fruits with sweet pulp.

Citrus depressa Hayata sp. nov. Frutex, ramulis viridissimis complanato-triquetris ad angulos obtusis flexuosis, interdum spinis 1–1½ cm. longis ad axillas foliorum instructis. Folia ovato-oblonga 8–9 cm. longa 3½–4 cm. lata apice leviter acuminata ad summum late obtusa ad centrum retusa basi late triangulari-obtusa margine subintegra leviter crenulata, petiolis 8 mm. longis angustissime alatis. Fructus depresso-globosus terminalis (pedunculis brevissimis) 23 mm. longus 4½ cm. latus rotundatus in circumscriptione vel interdum tenuiter lobulatus apice profunde basi tenuiter impressus, loculis 7–9, pericarpio tenuissimo 1 mm. crasso luteo-flavescenti sublævi, carnibus acidis. Semina ovoidea 1 cm. longa 6 mm. lata apice acuta rostrata ad summum obtusa, embryonibus pallido-viridescentibus.

Hab. Gaogan, sponte crescens.

Nom. Jap. *Hirami-Lemon.*

Resembles *Citrus limonelloides* Hay., but differs from it in the very much depressed and smaller fruits.

Citrus limonelloides Hayata sp. nov. Frutex 2–3 m. altus, ramis ascendentibus, ramulis viridibus ad axillas foliorum spinis 3–4 mm. longis instructis. Folia lanceolata vel oblongo-lanceolata apice obtusa ad summum plus minus retusa basi obtusa margine minute obscureque crenulata, petiolis 1 cm. longis haud vel vix alatis. Flores in alabastro extus purpurascentes obovoideo-clavati, pedunculis 4 mm. longis; flores apertientes 2 cm. longi extus leviter purpurascentes intus albicantes. Calyx cupuliformis 2 mm. longus 4 mm. latus margine leviter 5-dentatus, dentibus brevissimis latissimis acutis pallido-flavescentibus. Petala 5 oblanceolata 18 mm. longa 6 mm. lata extus medio purpurascentia intus albicantia apice triangulari-acuta basi attenuata ad basin 2 mm. lata intus concava. Stamina basi leviter connata fere libera, inæqualia, longiora 12 mm. longa, breviora 8 mm. longa. Ovarium viride ovoideum 2½ mm. longum, stylo columnari 7 mm. longo, stigmate clavato flavo; disco cupuliformi 2½ mm. in diametro. Fructus axillaris, pedunculis 5–6 mm. longis, globosus 3½–4½ cm. latus totiusque longus apice breve apiculatus, loculis 6–9, medulla tenui solida vel in maturo cava, carnibus acidis, pericarpio

2–3 mm. crasso rubescenti; seminibus ovoideis 1 cm. longis apice rostrato-acutis, embryonibus albicantibus.

Hab. Jokirin, Shirin, Shashi, cult.

Nom. Jap. *Hime-Lemon.*

Somewhat resembles *C. Limonia*; but greatly differs from it in the much smaller leaves and smaller fruits with a reddish skin. The new *Citrus* blossums in the beginning of February, and the fruits mature in January. The origin of this tree is quite uncertain. The type is more than 10 years old.

Citrus grandis Osbeck (Fig. 7); Swingle l.c. p. 782, fig. 975, form. **Buntan.** Frutex vel arborescens 6 m. altus, 4 m. latus longior quam latior. Folia oblonga 13 cm. longa 8 cm. lata apice obtusa et leviter retusa basi rotundato-obtusa margine integra leviter undulata crasse coriacea utraque pagine glabra, petiolis 28 mm. longis late alatis cum ala obcordato-cuneatis apice cordatis basi cuneatis circ. 2 cm. latis. Flores racemosi, racemis 9 cm.

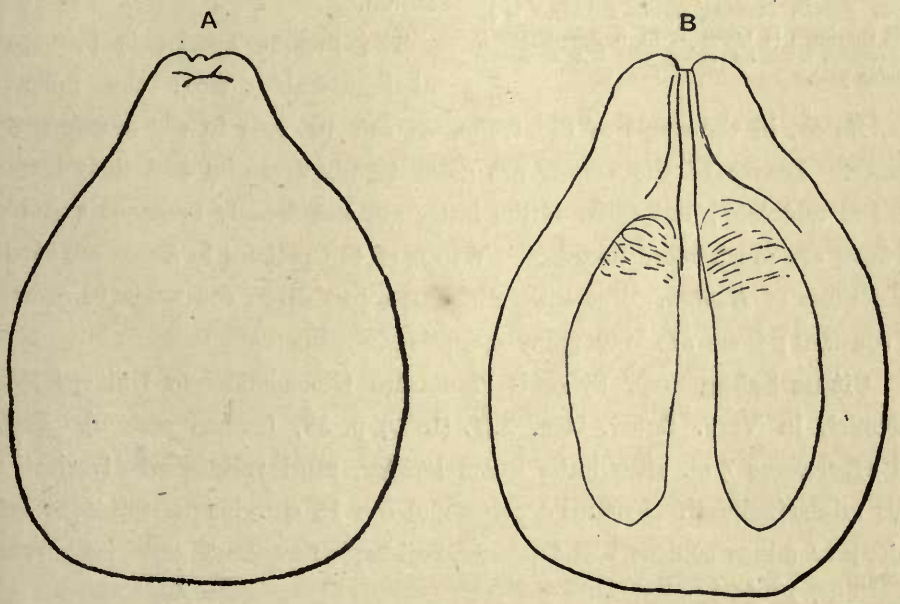
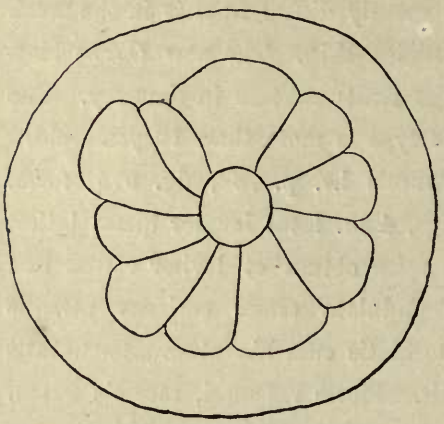


Fig. 7; *Citrus grandis* Osbeck form. *Buntan.* ×½.

longis, pedicellis cum rhachibus et calycibus tenuiter villoso-pubescentibus 2 cm. longis. Calyx hirsutus cupuliformis 5 mm. longus 13 mm. latus 4-dentatus, dentibus minutis. Petala 4 leviter crassiuscula oblonga vel oblongo-linearia

3 cm. longa 14 mm. lata apice obsusa basi haud vel leviter contracta valde reflexa. Stamina circ. 40, antheris linearibus 6 mm. longis $1\frac{1}{2}$ mm. latis apice apiculatis basi 2-lobatis. Discus annuliformis. Ovarium obovoideo-cylindricum 7 mm. longum 6 mm. latum sursum hirsutum, stylo columnari 12 mm. longo 3 mm. crasso, stigmate pulviniformi 3 mm. alto 7–8 mm. in diametro subpeltato. Fructus pyriformis 12 cm. longus 11 cm. latus circ. 10-locularis, pericarpio crasso flavescenti; carnibus fere albicantibus.



Citrus grandis Osbeck form. *Buntan*. × $\frac{1}{3}$. This specimen is taken from a young tree; a specimen from an older one has a much thinner peel.

Hab. Shintiku, Shirin, leg. B. Hayata.

Nom. Jap. *Buntan*, 文旦.

Note: Flowers towards the end of March.

The present species is principally distinguishable from the following one, *Zabon*, in the shape of the fruits, as can be seen in the accompanying figures. Leaves of the former are more densely arranged and their surfaces are less undulate; but those of the latter are less densely arranged and their surfaces are much more undulate. Wings of the petioles in *Zabon* are smaller than those of *Buntan*. But these differences just given can never be regarded as constant; there are very many exceptions.

Citrus Sabon Sieb. Synopsis Plantarum Oeconomicarum Universi Regni Japonici, in Verh. Batav. Gen. XII. (1830) p. 59, (nomen nudum). Frutex vel arborescens 7 m. altus latior quam longior, rami validissimi divaricati vel plus minus inclinati. Fructus depresso-globosus 18 cm. longus totiusque latus apice plus minus conicus basi depressus, pericarpio flavescenti, carnibus purpurascentibus, 10–15-locularis.

Citrus decumana Lour.; Hayata Gen. Ind. p. 11.

Hab. Shinkiku, Shirin, ubique cult.

Nom. Jap. *Zabon*, 朱欒; Yū, 柚.

There are several forms of this *Citrus*. They are as follows.

Form. **Jiyū** (時柚) Seeds very many; fruits nearly globose, more or less depressed 8½ cm. long 9½ cm. broad, the smallest of all forms of this *Citrus;* peel 1½ cm. thick, pulp bitter slightly purple; usually grown by seeds. There are two forms, one has slightly purple pulp, the other white pulp.

Form. **Sōyū** (早柚): Fruits ovoid more or less depressed and impressed at the base and apex, 18–19 cm. long, 16–17 cm. broad, skin 1½ cm. thick; pulp slightly purple.

Form. **Banyū** (晩柚) Fruits larger and more rounded than the preceding form, nearly as long as broad, 19 cm. long; peel thicker than the preceding, 2½ cm. thick; pulp slightly purple.

Form. **Sekitōyū** (石頭柚) (Fig. 8) Fruits rounded like the preceding form, but more or less pyriformed towards the peduncle, 17 cm. long, 18 cm. broad; peel the thinnest of all forms of this *Citrus*, 1½ cm. thick; pulp slightly purple like the preceding. Cells mostly 16.

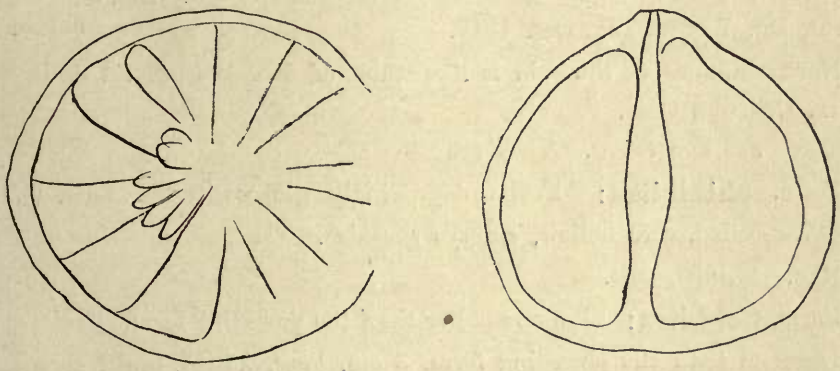


Fig. 8; *Citrus Sabon* Hayata form. *Sekitōyū*. ×¼.

Form. **Mitsuyū** (密柚) Fruits more depressingly rounded than the other forms, large as the preceding, pulp slightly purple, much softer than any other form, peel thin as the preceding.

Form. **Hakunikuyū** (白肉柚) Fruits ovoidly rounded, 17 cm. long, 16 cm. broad, peel usually thicker than the preceding forms, 22 mm. thick, white; pulp not purple, nearly white, sweeter than any other forms.

Citrus mitis Blanco (Fig. 9); Swingle l.c. p. 784. Frutex 3 m. altus 2½ m. latus. Rami ascendentes vel divaricati acute triquetri, ramulis sterilibus

ad axillas spinescentibus, spinis 5 mm. longis, ramulis fertilibus inermibus. Folia tenuiter coriacea oblonga vel obovata 6–7 cm. longa 3½–4 cm. lata apice obtusa vel obtusissima interdum retusa basi cuneata margine obscure crenulata, petiolis 1 cm. longis angustissime alatis, alis ⅔ mm. latis, vel haud alatis. Flores albi axillares solitarii, pedicellis 4 mm. longis. Calyx campanulato-cupuliformis 4–5 mm. in diametro 5-dentatus, dentibus triangularibus acutis plus minus flavescentibus. Petala 5 lineari-oblonga 1½ cm. longa 5 mm. lata apice triangulari-acuta. Stamina circ. 20 toto connata. Ovarium viride; stylo columnari, stigmate globoso-obconico. Fructus subterminalis subsolitarius vel axillaris globosus 2½ cm. longus totiusque latus, vel depresso-globosus circ. 6-locularis, medulla cava; pericarpio tenui fere stricto, carnibus valde acidis, embryonibus viridibus.

Fig. 9; *Citrus mitis* Blanco.

Nom. Jap. *Saiseikitsu* 再生桔, *Shikikitsu* 四季橘, *Gekkitsu* 月橘, *Tokinkan* 唐金柑.

Hab. Shintiku, cult.; Loo-choo: Yonakuni, sponte crescens, leg. Y. Shimada, Oct. 1917.

Note: Colour of the skin is like that of No. 106—No. 151 in Klin. et Val. Cod. des Coul.

There are two forms. They are:—

Form. **Shikikitsu:** Fruits depressingly globose 3 cm. long, 3.7 cm. broad, 7–8-celled, core hollow, embryo greenish.

Hab. Shinpō, cult.

Form. **Gekkitsu:** Flowers smaller than the preceding form. Fruits globose less depressed than the preceding form, 3 cm. long, 3.5 cm. broad, core hollow, nearly 8-celled, embryo greenish.

Hab. Shintiku, Shinpo, cult.; Gaogan, sponte crescens.

Citrus nobilis Lour. var. **Ponki** Hayata n.v. (Fig. 10). Frutex 2½ m. altus 3 m. latus, ramis divaricatis gracilibus subscandentibus, lateralibus inclinatis. Folia oblonga 7 cm. longa 3 cm. lata apice acuta vel acuminata ad summum obtusa et retusa basi acuta vel cuneata margine crenata tenuiter coriacea glabra, petiolis 7–10 cm. longis angustissime alatis vel haud alatis. Flores subterminales geminati vel solitarii stipitibus 5 mm. longis glabris pedicellati. Calyx subplanus glaber 5-lobatus, lobis late triangularibus 2½ mm. latis 1½

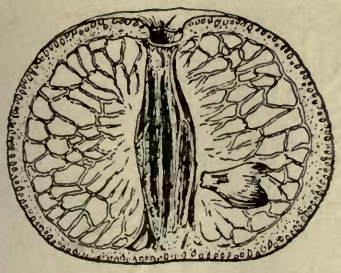


Fig. 10; *Citrus nobilis* Lour. var. *Ponki* Hay.

mm. longis apice acutis margine sub lente ciliolatis. Petala 5 patentia plus minus deorsum recurva 14 mm. longa 6 mm. lata apice obtusa plus minus contracta. Stamina circ. 20, filamentis toto a basi usque ad prope apicem connatis crassiusculis, antheris ovato-oblongis 2 mm. longis 1 mm.—1½ mm. latis apice obtuse apiculatis basi 2-lobatis. Discus annularis Ovarium globosum 2 mm. longum totiusque latum glabrum viride, stylo columnari 6 mm. longo 1 mm. crasso, stigmate pulviniformi 1½ mm. longo 2½ mm. lato. Fructus depresso-globosus 3 cm. longus 4 cm. latus circ. 9-locularis, medulla cava, pericarpio tenui haud stricto; carnibus dulcibus; embryonibus albicantibus.

Hab. Shintiku, cult.

Nom. Jap. *Ponki* 凸橘.

Note: Colour of the skin is like that of No. 126 in Klin. et Val. Code des Coul. This tree, when quite old, attains a height of 2 m. 75 cm., the branches spreading over 4 m. 25 cm. in width.

Citrus nobilis Lour. var. **Sunki** Hayata n. v. Frutex 3 m. 20 cm. altus, 4 m. 30 cm. latus, latior quam longior, ramis valde divaricatis ramosissimis, ramulis triquetris ad angulos obtusis. Folia ovato-oblonga vel oblonga 5½ cm. longa 3½ cm. lata apice obtusissima ad summum emarginata vel retusa basi obtusa vel acuta margine duplicato-crenata, petiolis 1 cm. longis. Fructus axillaris vel terminalis solitarius (pedunculis brevissimis 5–6 mm. longis), depresso-globosus 33 mm. longus 47 mm. in diametro tenuissime 10–lobatus in circumscriptione apice basique impressus, pericarpio lævi luteo tenui 1½ mm. crasso, 7–10-locularis, medulla cava, carnibus acidis; seminibus ovoideis apice rostratis 12 mm. longis, embryonibus pallido-viridibus.

Hab. Shinpo, cult.

Nom. Jap. Sunki 酸橘.

This variety resembles *C. nobilis* Lour. var. *Ponki*, but differs from it in the very much obtuse leaves and acid pulp. The leaves of this variety are rather variable, some are crenate, but others entire; some branches are spinescent, but others armless.

Citrus nobilis Lour. var. **deliciosa** Swingle (Fig. 11). Swingle l.c. p. 784. Frutex $3\frac{1}{2}$ m. longus $3\frac{1}{4}$ m. latus, ramis ascendentibus plus minus divaricatis. Folia oblonga 7 cm. longa $3\frac{1}{2}$ cm. lata apice obtusissima et retusa basi acuta vel obtusa margine obscure crenulata glabra, petiolis circ. 1 cm. longis angustissime alatis. Flores..... Fructus depresso-globosus $4\frac{1}{2}$ cm. longus 6 cm. latus; pericarpio tenui laevi; medulla cava.

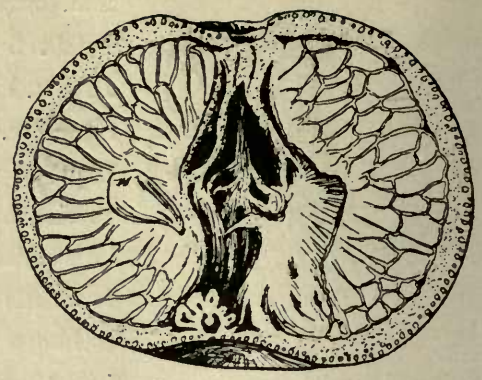


Fig. 11; *Citrus nobilis* Lour. var. *deliciosa* Swingle.

Hab. Shintiku, cult.

Nom. Jap. *Ankan* 紅柑. *Ōbenimikan*; Fukushū-Kan 福洲柑.

This form is very near a Chinese one, called Mandarin Orange. The fruits of this *Ankan* are smaller than those of the Mandarin Orange. The tree are nearly the same as that of the following variety *poonensis*; but the leaves of the present *Citrus* are more dark-green, and the branches are more densely arranged. Colour of the skin is like that of No. 101 and that of the pulp is No. 126 in Klin. et Val. Code des Coul.

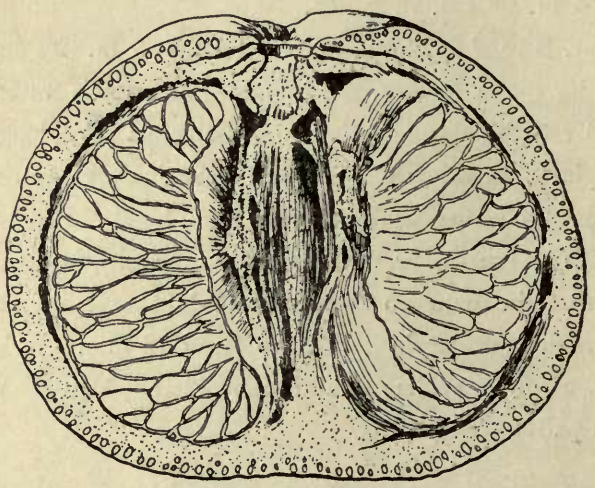


Fig. 12; *Citrus nobilis* Lour. var. *Unshū* Swingle.

The Japanese *Usukawamikan* or simply Mikan is another form of this variety.

Citrus nobilis Lour. var. **Unshū** (Mak.) Swingle (Fig. 12) l. c. p. 784.

Hab. Shintiku, cult.

Nom. Jap. *Unshū* 溫洲.

Note: This differs from all the species of the Formosan *Citrus* by the very much acuminate anthers. Colour of the skin is like that of No. 106 and that of the pulp. is No. 126 in Klin. et Val. Code des Coul.

Citrus nobilis Lour. var. **poonensis** Hayata n. n. (Fig. 13, 14 et 15). *Citrus nobilis* Hayata Gen. Ind. p. 11. (non Lour.). *Citrus nobilis* Lour. subsp. *Keonla* Engl. var. *poonensis* C. Tanaka in the *Nōgaku-Kwaihō* No. 118, pp. 7–28. Frutex $3\frac{1}{2}$ m. altus 3 m. latus; rami minus divaricati sub-ascendentes haud inclinati. Folia oblonga tenuiter coriacea 8–9 cm. longa $4\frac{1}{2}$ cm. lata apice obtusissima et retusa basi acuta vel obtusa margine crenulata, petiolis circ. 1 cm. longis angustissime alatis. Flores quasiterminales vel axillares solitarii, stipitibus 5 mm. longis glabris pedicellati. Calyx glaber subplanus 5-lobatus, lobis triangularibus vel oblongis $1\frac{1}{2}$–2 mm. longis apice triangularibus margine remote vel sparcissime ciliolatis cæterum glabratis supra concavis pallido-viridescentibus. Petala 5 alba erecto-patentia plus minus deorsum recurva vel haud recurva oblonga vel lanceolata 12 mm. longa $5\frac{1}{2}$–6 mm. lata apice obtusa basi plus minus contracta glabra. Stamina 15–16, filamentis basi plus minus contractis sursum distinctis crassiusculis albis 7–6 mm. longis 1mm. latis apice angustatis, antheris flavis ovato-oblongis 2–$2\frac{1}{2}$ mm. longis $1\frac{1}{3}$ mm. latis apice obtuse apiculatis basi cordatis vel bi-lobatis. Discus annularis. Ovarium depresso-globosum 2 mm. longum $2\frac{1}{2}$ mm. latum, stylo columnari 7 mm. longo $1\frac{1}{2}$ mm. lato, stigmate pulviniformi $2\frac{1}{2}$

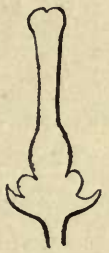


Fig. 13; *Citrus nobilis* Lour. var. *poonensis* Hayata; showing the absence of an articulation between the style and ovary.

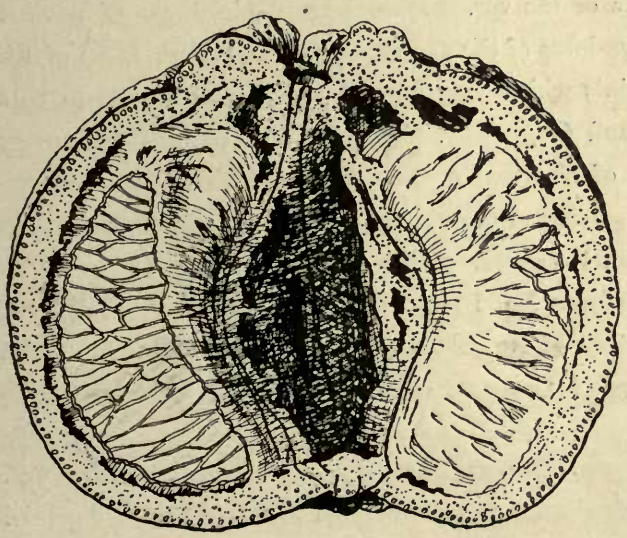


Fig. 14; *Citrus nobilis* Lour. var. *poonensis* Hayata; a form with a navel at the base (top in the figure).

mm. in diametro 1 mm. crasso. Fructus depresso-globosus basi interdum conico-gibbosus 7 cm. longus 8 cm. latus, pericarpio valde rugoso valde laxo haud stricto; medulla cava.

Hab. Shinpo cult.

Nom. Jap. *Ponkan* 凸柑, 椪柑.

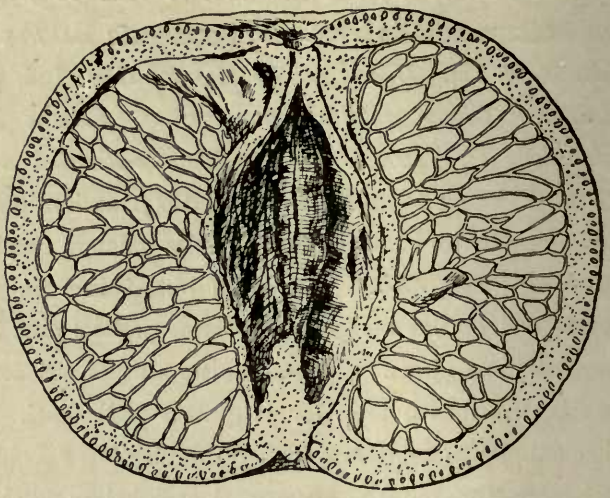


Fig. 13; *Citrus nobilis* Lour. var. *poonensis* Hayata; a form without a navel at the base, (top in the figure).

The variety resembles *Citrus Tankan* in flowers and leaves; but the flowers are smaller, petals narrower, leaves obtuser in the present variety, than those in the latter. There is no distinct articulation between the ovary and style in the former, while such is very distinct in the latter. Leaves of the variety are quite smooth on the upper surface, but those of *C. Tankan* have very minute elevated dispersed dots. The flowers of the var. *poonensis* resemble those of another variety *Ponki;* but the calyx-lobes of the former are obtuser than those of the latter. There are some points which may suggest the present orange to be a hybrid between *C. nobilis* and *C. grandis.* They are the anthers and ovary which resemble much those of *C. grandis.* But, this is, I think, a mere accidental feature, all other characters of the present orange are essentially of those of *C. nobilis.* In one form, the colour of the skin is like that of No. 151—No. 126, and that of the pulp is No. 131; while in another, the colour of the skin and pulp is like that of No. 126 in Klin. et Val. Code des Coul. This tree, when quite old, attains a height of 5 m. 14 cm., the branches spreading over 4½ m. in width.

Citrus nobilis Lour. var. **Genshokan** Hayata n. v. *C. nobilis* var. *Mikan* Sieb.? in Synopsis Plantarum Oeconomicarum Universi Regni Japonici p. 59, (nomen nudum). Frutex 3 m. 82 cm. altus, 3 m. 85 cm. latus; ramis ascendentibus gracilibus. Folia lanceolata vel ovato-lanceolata vel oblonga

5–7 cm. longa 2 cm.–3½ cm. lata apice acuminata ad summum retusa basi acuta margine remote obscurequec renulata, petiolis 8 mm. longis angustissime alatis. Fructus depressoglobosus 6½ cm. latus 4½ cm. longus, medulla cava, carnibus dulcibus; loculis circ. 10, seminibus ovoideis 1 cm. longis apice longe rostratis pallido-viridibus in sectione; pericarpiis tenuibus 2 mm. crassis.

Hab. Shintiku, cult.

Nom. Jap: *Genshōkan* 元霄柑, *Jimikan.*

This fruits have a small pore at the apex, in which respect this may be identical with the Japanese *Jimikan.*

Citrus sinensis Osbeck; Swingle l.c. p. 783, fig. 977, form. **Sekkan** (Fig. 16 et 18–5). Frutex 2½ m. altus 3 m. latus; rami validi plus minus divaricati.

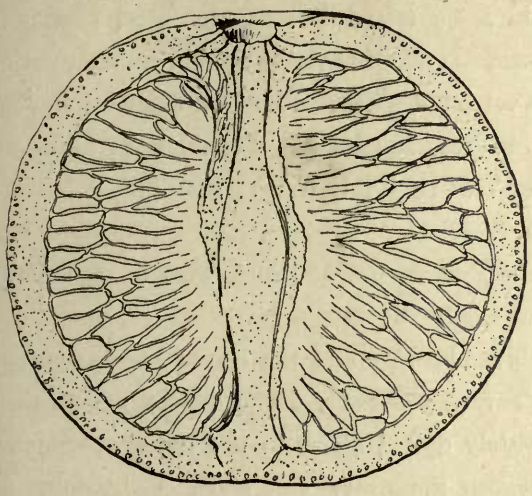


Fig. 16; *Citrus sinensis* Osbeck form. *Sekkan.*

Folia oblonga 9–10 cm. longa 5–6 cm. lata apice breve acuminata vel acuta ad summum obtusa et retusa basi acuta cuneata vel obtusa margine subintegra vel obscure serrulata versus basin integra glabra coriacea, petiolis 2 cm. longis angustissime alatis. Flores axillares vel quasiterminales solitarii vel rarius racemosi, pedicellis 1 cm. longis. Calyx cupuliformis glaber 4–5 mm. longus 6 mm. latus apice 4- vel 5-lobatus, lobis triangularibus acutis apice cuspidatis margine ciliolatis. Petala 4 obovata 12 mm. longa 9 mm. lata apice obtusa basi perfecte truncata haud contracta basi leviter sursum valde extrorse recurva. Stamina circ. 20, filamentis plus minus connatis, antheris linearibus 3 mm. longis 1½ mm. latis apice obtuse apiculatis basi 2-lobatis. Dicus annularis. Ovarium globosum 3 mm. longum 3 mm. latum apice fere constrictum, stylo 7 mm. longo, stigmate pulviniformi 2 mm. longo 3 mm. in diametro. Fructus depresso globosus 6 cm. longus 7 cm. latus, medulla solida; carnibus dulcibus. Semina cuneato-ovoidea.

Citrus Aurantium HAYATA Gen. Ind. p. 11, (non LINN.)

HAB. Shintiku, Taihoku, cult.

NOM. JAP. *Sekkan* 雪柑. *Kinkunenbō, Tōmikan.*

NOTE: Colour of the skin is like that of No. 131 and that of the pulp, No. 151 in KLIN. et VAL. Cod. de Coul. Branches are somewhat like those of *C. Daidai,* but less ascending than those of *C. nobilis* var. *poonensis.* Flowers in the middle of May.

Valencia late, Bahia, Washington Navel and THOMPSON'S *Improved Navel* are all forms of *Citrus sinensis* OSBECK.

Citrus Tankan HAYATA sp. nov. (Fig. 17 et 18–6) Frutex $2\frac{1}{4}$ m. altus $3\frac{1}{2}$ m. latus, rami validi sed divaricati inclinati ascnedentes. Folia oblongo-lanceolata coriacea 9–10 cm. longa $3\frac{1}{2}$ cm. lata apice triangulari-acuminata ad summum obtusissima et mucronata basi acuto-cuneata margine versus apicem crenata, petiolis 1 cm. longis angustissime alatis vel haud alatis. Rami ad axillas foliorum spinescentes, spinis 5 mm. longis. Fructus subglobosus 6 cm. longus totiusque latus; pericarpio plus minus stricto fere lævi vel rugoso; carnibus dulcibus; medulla partim solida partim cava.

Note: Colour of the skin is like that of No. 156 and that of the pulp No. 151 in KLIN. et VAL. Code des Coul.

The flowers are larger, the petals are broader and the leaves are less obtuse in this species, than in *C. nobilis* var. *poonensis.* The leaves of *Tankan* are more or less minutely and elevately dotted above in the living specimens. There is a distinct articulation between the ovary and style. Calyx-lobes of *Tankan* are acute at the apex. Flowers of this species are a little larger than those of *C. nobilis* var. *poonensis,* but of nearly the same characters of the latter. The fruits with a nearly tight skin and a solid core somewhat resemble those of *C. sinensis.* The branches too indicate the characters of those of the latter.

There are three forms. They are:—

C. Tankan proper. Fruits broadly globose 6 cm. in length, 7 cm. in width. The tree, when quite old, attains a height of nearly 4 m., the branches spreading over 5 m. in width.

HAB. Shintiku, Shirin, Washōshū.

NOM. JAP. *Tankan* 桶柑.

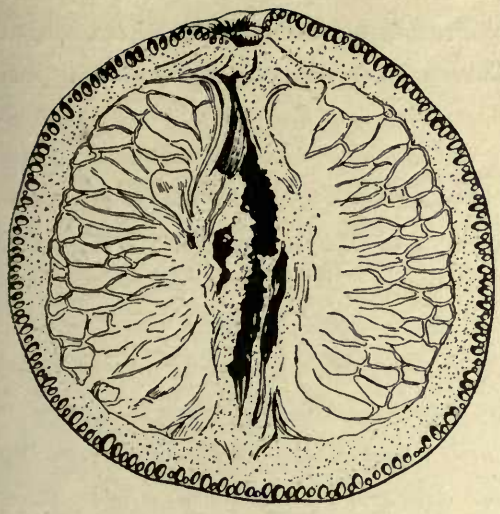


Fig. 17; *Citrus Tankan* HAYATA.

Form. **Koshōtankan.** Fruits a little higher than those of *Tankan* proper, 7½ cm. long, 8 cm. broad; skin more rugose and more reddish when mature; they mature a month later than *Tankan*.

HAB. Shintiku, Shirin, Washō-shū, cult.

NOM. JAP. *Kōshōtankan* 高墻桶柑.

Form. **Haili** Fruits nearly rounded slightly depressed 6–7 cm. long 7 cm. broad, skin very smooth shining, core partly hollow, partly solid, embryo white.

HAB. Shintiku cult.

NOM. JAP. *Haili* 海梨.

Citrus Daidai SIEB. (Fig. 18, 1–4); SIEB. Synopsis Plantarum Oeconomicarum Universi Regni Japonici, in Verh. Batav. Gen. XII. (1830) p. 59, (nomen nudum). Folia coriacea oblonga vel elongato-oblonga 13 cm. longa 6½ cm. lata versus apicem subito acuta vel acuminata ad summum obtusa et retusa basi obtusa margine inegra plus minus undulata utraque glabra, petiolis 3 cm. longis valde alatis cum alis obovato-cuneatis 1 cm. latis apice rotundatis basi cuneatis. Flores quasiterminales solitarii, pedicellis 7 mm. longis glabris crassiusculis. Calyx extus hirsutus cupuli-formis 5-sulcatus 5-lobatus, lobis erectis 4 mm. longis triangularibus 4 mm. longis 5 mm. latis apice acutis margine ciliolatis extus hirsutis basi intus callo singulo instructis. Petala 5 oblanceolata vel oblanceolato-spathulata 2½ cm. longa 7 mm. lata apice subacuta basi attenuata, partibus attenuatis 9 mm. longis 3–3½ mm. latis, plus minus costata deorsum erecta sursum extrorse recurva. Stamina circ. 20, filamentis 1 cm. longis fere toto connatis sed sursum liberis, antheris ovato-linearibus 3½ mm. longis 1–1¼ mm. latis apice obtusis vel plus minus apiculatis basi 2-lobatis. Discus annularis. Ovarium oblongum 5 mm. longum 4 mm. latum, stylo columnari 10 mm.

longo 2 mm. crasso basi plus minus dilatato cum ovariis articulato, stigmate pulviniformi 4 mm. lato 2 mm. longo. Fructus depresso-globosus $5\frac{1}{2}$ cm. longus 6–7 cm. latus; medulla solida; carnibus acidis. Semina cuneato-ovata plus minus complanata 1 cm. longa.

HAB. Shintiku cult.

NOM. JAP. *Hyonkan* 香橙.

NOTE: Colour of the skin is like that of No. 131 or No. 156 in KLIN. et VAL. Code des Coul.

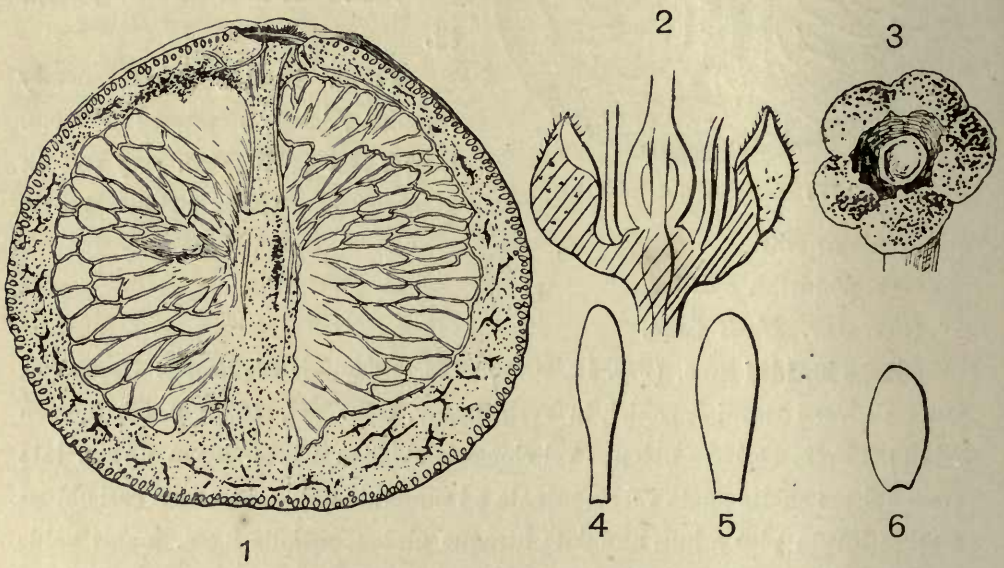


Fig. 18; Various species of *Citrus*. 1, a fruit of *Citrus Daidai* HAYATA 2, calyx and ovary in section of the same species; 3, accrescent calyx of the same; 4, petal of the same; 5, a petal of *Citrus sinensis* form. *Sekkan*; 6, a petal of *Citrus Tankan* HAYATA.

Differs from *C. Aurantium* by the fruits with a solid core. It may be hybrid between *C. Aurantium* and *C. sinensis*. Flowers in the middle of February. The present species is very near with a Japanese one, called *Daidai* 橙 or *Kwaiseikan* 恢青柑, and we think the Formosan one is identical with the latter. The petals of the present *Citrus* are much narrower than those of any of the Formosan oranges. It is nearly similar to the following species, *Natsudaidai*; the fruits come quite close to those of *C. sinensis* forma *Sekkan*.

Citrus Natsudaidai HAYATA sp. nov. (Fig. 19) *Citrus Aurantium* LINN. subsp. *sinensis* ENGL.; HAYATA Gen. Ind. p. 11. Frutex $2\frac{1}{2}$ m. altus 4 m. latus; rami validi divaricatissimi. Fructus depresso-globosus 8 cm. longus 10 cm. latus; pericarpio plus minus laxo; medulla partim solida partim cava.

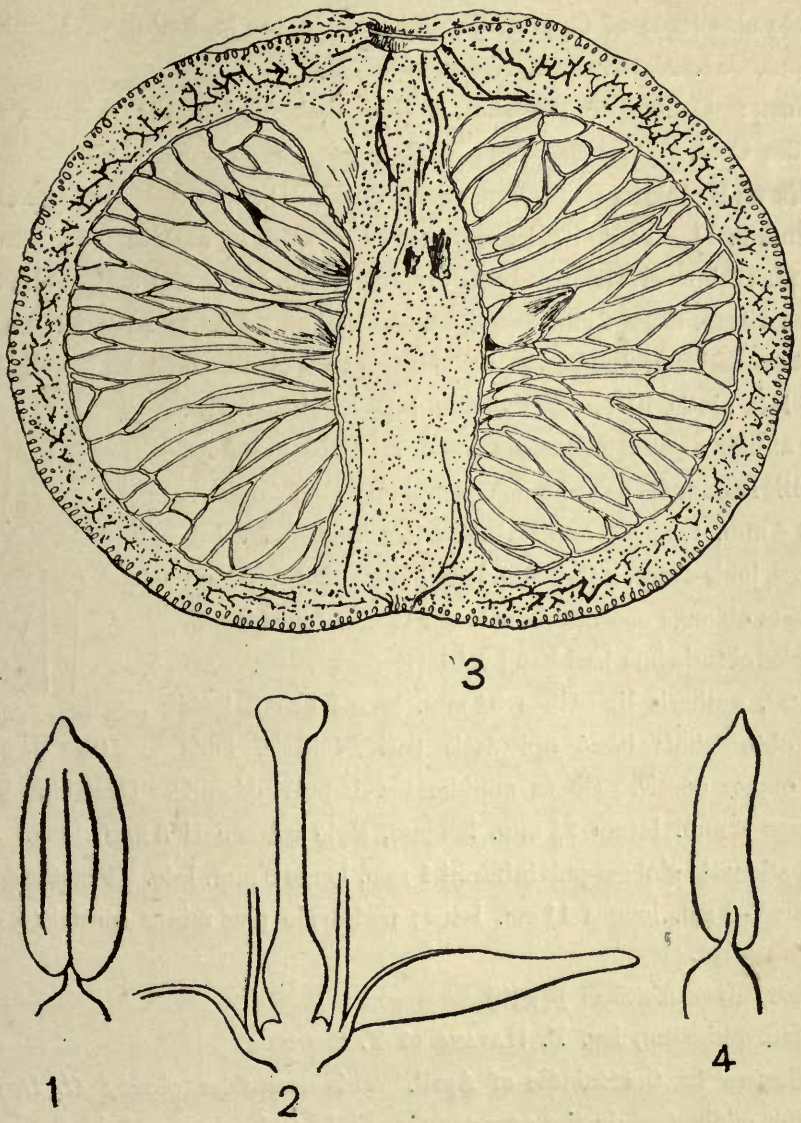


Fig. 19; 1, an anther of *Citrus Natsudaidai;* 2, calyx and ovary of the same species; 3, a fruit of the same; 4, an anther of *Citrus grandis.*

Hab. Shintiku, cult. leg. Y. Shimada et B. Hayata.

This looks like a hybrid between *C. grandis* and *C. Kotokan*. The stigma of the present species, as seen in the accompanying figure, somewhat resembles that of *C. grandis;* the calyx is more or less hirsute, as is the case with the latter. There is a slight constriction between ovary and style. The anthers resemble also those of *C. grandis*. Flowers in the beginning of March.

Nom. Jap. *Natsumikan, Natsudaidai* 夏橙.

Note: Colour of the skin is like that of No. 161 in Klin. et Val. Code des Coul.

Citrus Kotokan Hayata sp. nov. (Fig. 20, 21) *Citrus hybrida* Linn., Hayata Gen. Ind. p. 11. Frutex vel arborescens 4 m. altus in ambitu 5 m. latus, rami validi plus minus divaricati, ad axillas spinis 6 mm. longis instructi. Folia oblonga coriacea 10 cm. longa 6 cm. lata apice obtusissima vel acuta ad summum obtusa vel retusa basi subrotundata margine integra vel obscure crenata, petiolis 1–2 cm. longis late alatis, alis apice 3–4 mm. latis basi attenuatis. Flores axillares quasiterminales solitarii vel rarius racemosi, pedicellis incrassatis 5–7 mm. longis glabris. Calyx cupuliformis 4 mm. longus 9 mm. latus leviter 5-lobatus vel 5-dentatus, lobis 4 mm. latis 2 mm. longis apice acutis. Petala 5 obovata oblongo-obovata vel oblonga 17 mm. longa 9 mm. lata apice obtusissima basi haud vel leviter contracta. Stamina 20, antheris linearibus $3\frac{1}{2}$ mm. longis 1 mm. latis apice obtusissimis haud apiculatis basi 2-lobatis, lobis apice obtuse acutis. Discus annularis vel pulviniformis. Ovarium depresso-globosum 4 mm. latum $2\frac{1}{2}$ mm. longum, stylo columnari 5 mm. longo $1\frac{1}{2}$ mm. crasso, stigmate globoso-pulviniformi 1 mm. longo 2 mm. lato. Fructus depresso-globosus 7–8 cm. longus 11 cm. latus; pericarpio plus minus constricto rugoso; medulla solida.

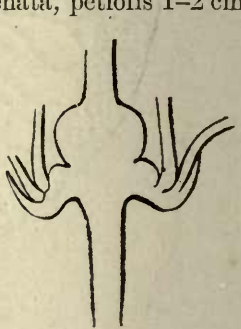


Fig. 20; *Citrus Kotokan* Hayata.

Nom. Jap. *Kotōkan* 虎頭柑.

Hab. Shintiku, leg. B. Hayata et Y. Shimada.

Flowers in the middle of April. This resembles closely *C. Daidai* in the habit of the tree, in the accrescent pedicels and calyx, and in the anthers; but it bears the character of *C. nobilis* var. *poonensis* in the depressing globose

ovary, and in the fruits and petals; at the same time, it bears some affinity to *C. grandis* in the shape of the leaves. Flowers of the present species are smaller than those of the latter, but totally different in the shape of the anthers. In the present *Citrus*, they are obtuse at the apex, while in *C. grandis* they are apiculate. Calyx is glabrous in the former, but it is hirsute in the latter. This is very probably a hybrid between *C. Aurantium*, *C. sinensis*, *C. nobilis* and *C. grandis*.

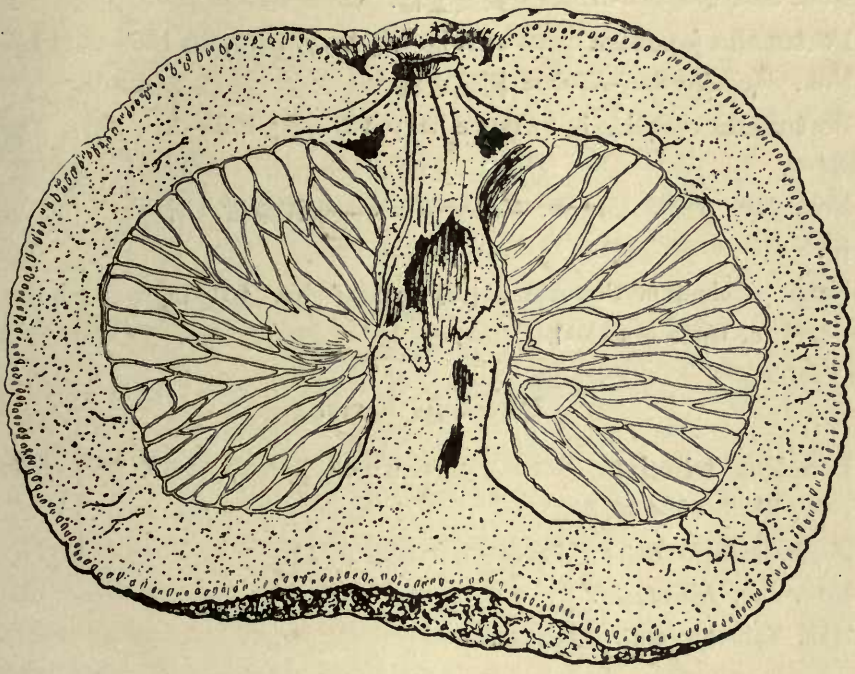


Fig. 21; *Citrus Kotokan* HAYATA.

NOTE: Colour of the skin is like that of No. 116 or that of No. 207 in KLIN. et VAL. Code des Coul.

Fortunella SWINGLE.

Key to Species (after SWINGLE).

1. Fruits 4-, 5-, 6- (or rarely 7-) celled, pulp vesicles abundant, their stalks arising from the smooth ovary wall, peel of fr. thick and fleshy.

α. Fruits 4 or 5-celled oval or oblong. .....*F. margarita.*

β. Fruits round usually 5–6-celled. .....*F. japonica.*

γ. Fruits slightly oval 6–7-celled with a thicker peel.....*F. crassifolia.*

2. Fruit 3–4-celled, having between the stalks of the pulp-vesicles many minute wart-like, pale yellow cellular masses, peel of fr. thin but slightly fleshy. .....*F. Hindsii.*

Fortunella margarita Swingle l. c. p. 1269, fig. 1563–1, et 1564–1.

Nom. Jap. *Nagami-Kinkan* 長實金柑.

Fortunella japonica Swingle (Fig. 23), l.c. p. 1270, fig. 1563–2, et 1564–2.

Nom. Jap. *Marumi-Kinkan* 圓實金柑.

Fortunella crassifolia Swingle l.c. p. 1270, fig. 1563–3, et 1564–3.

Nom. Jap. *Nenpo-Kinkan, Meiwa-Kinkan* 寧波金柑, 明和金柑.

Fig. 23; *Fortunella japonica* Swingle.

Note: Colour of the skin is like that of No. 131 in Klin. et Val. Code des Coul.

Poncirus Rafin.

Poncirus trifoliata Rafin.; Swingle in Bailey Stand. Cycl. Hort. p. 2751, fig. 3123, 3124 et 3125.

Aegle sepiaria DC.; Hayata Gen. Ind. p. 11.

Nom. Jap. *Karatachi.*

Hab. Taihoku, cult.

Sapindaceæ.

Turpinia Vent.

Turpinia arguta Seem.; Benth. Fl. Hongk. p. 48.

Turpinia nepalensis Hayata Gen. Ind. Fl. Formos. p. 16. (non Walp.).

Leguminosæ.

Entada Adans.

Entada formosana Kanehira Formosan Trees, p. 195.

Entada Scandens MATSUM. et HAYATA Enum Pl. Formos. p. 116, pro parte. (non BENTHAM).

Entada phaseoloides MERRILL; KANEHIRA Formosan Trees, p. 193.

Entada scandens MATSUM. et HAYATA Enum. Pl. Form. p. 116, pro parte (non BENTHAM).

Rosaceæ.

Rubus LINN.

Rubus Koehneanus FOCKE var. **formosanus** CARD. (Subgen. *Idaeobatus*, Sect. *Corchorifolii*) CARD. in Not. Syst. III. p. 306 (1917). HAB. Thai (FAURIE, 1914, No. 59).

Rubus rosaefolius SM. var. **formosanus** CARD. (Subgen. *Idaeobatus*, Sect. *Rosaefolii*) in Not. Syst. III. p. 306 (1917). HAB. Arisan (FAURIE 1914, No. 41, 42).

Rubus rosaefolius SM. var. **polyphyllarius** CARD. l.c. p. 306. HAB. Arisan, (FAURIE 1914, No. 34).

Rubus triphyllus THUNB. var. **subconcolor** CARD. l.c. p. 311. HAB. Taihoku, Kelung, (FAURIE, 1903, No. 137 et 138).

Rosa LINN.

Rosa multiflora THUNB. var. **formosana** CARD. in Not. Syst. III. p. 263 (1916). HAB. Arisan.

Rosa Luciae FRANCH. et ROCH. var. **formosana** CARD. in Not. Syst. III. p. 266 (1916).

Stranvaesia LINDL.

Stranvaesia niitakayamensis HAYATA n.n.

Photinia niitakayamensis HAYATA Mater. Fl. Formos. p. 103.

Crassulaceæ.

Kalanchoe ADANS.

Kalanchoe Takeoi HAYATA sp. nov. Suffrutescens annua. Caulis erectus simplex haud vel pauce romosus teres glaber ad nodos prominente elevatus.

Folia opposita crassiuscula, petiolis 4 cm. longis; inferiora cruciforme 3-partita, partibus aequalibus lanceolatis 9-10 cm. longis 2 cm. latis apice acuminatis basi attenuatis margine obscure serratis glabris; superiora minora linearia. Cymæ terminales vel axillares, bracteis linearibus minoribus glabris, pedicellis 1 cm. longis. Sepala 4 erecta lanceolata basi connata 6–7 mm. longa $1\frac{1}{2}$ mm. lata apice acuminata crassiuscula 3-nervia glabra. Corollae tubus 1 cm. longus basi ampulli-formis 3 mm. latus glaber; limbo rotato 4-partito, partibus oblongis lanceolatis 6 mm. longis $2\frac{1}{2}$ mm. latis apice subito acuminatis basi plus minus contractis flavis 8-9-nerviis integris. Stamina 8 ad faucem tubi 2-seriatim inserta, antheris oblongis apice emarginatis basi auriculato-cordatis $\frac{2}{3}$ mm. longis $\frac{1}{2}$ mm. latis, partibus liberis filamentorum 1 mm. longis glabris. Ovarium ovoideum apice ad stylum attenuatum, stylis 4 distinctis 2 mm. longis.

Hab. Nantō: Hokusankō, leg. T. Itō, Sept. 1916.

Near *K. gracilis* Hance; but differs from it by the much larger form with smaller flowers; also resembles *K. laciniata* DC. (Clarke in Hook. f Fl. Brit. Ind. II. p. 415), but distinguishable from it in the quite glabrous flowers with non-apiculate anthers.

Droseraceæ.

Drosera Linn.

Drosera lunata Buch.-Ham.; DC. Prodr. I. p. 319.

Drosera peltata Hook. f. Fl. Brit. Ind. II. p. 424.; Dunn et Tutch. Fl. Hongk. et Kwangt. p. 100; Hayata Ic. Pl. Formos. III. p. 113.

Hab. Toyen, leg. Aida, Mart. 1916. New to the flora of Formosa.

Cornaceæ.

Cornus Linn.

Cornus taiwanensis Kanehira Form. Tree p. 282.

Hab. Holisha.

Caprifoliaceæ.

Viburnum Linn.

Viburnum mushaense Hayata sp. nov. (Fig. 24) Frutex, ramuli

hornotini dense tenuiter breviterque fulvo-tomentosi demum subglabri. Folia ad apicem ramuli hornotini oppositim 2 disposita oblonga vel ovato-oblonga 11-13 cm. longa 6-7 cm. lata apice cuspidato-caudata basi subcuneata ad extremitatem tenuiter cordata margine argute dentata, dentibus cuspidiformibus triangularibus 3 mm. longis 5 mm. latis a se 7-8 mm. remotis, tenuiter chartacea (vel membranacea supra subglabra subtus hirsuta, petiolis 7 mm. longis tomentosis, stipulis nullis. Cymae terminales 3 cm. longae 6-7 cm. latae dense tomentosae, pedicellis 2 mm. longis stellato-tomentosis. Ovarium cum tubo calycis 1 mm. longum $\frac{2}{3}$ mm. latum dense stellato-tomentosum, lobis calycis oblongis $\frac{1}{2}$ mm. longis $\frac{1}{3}$ mm. latis apice truncatis extus dense tomentosis intus glabris. Corolla rotata, tubo brevissimo $\frac{1}{4}$ mm. longo, lobis 5 oblongo-ovatis $1\frac{2}{3}$ mm. longis $1\frac{1}{3}$ mm. latis apice rotundatis dorso hirsutis intus glabris, filamentis glabris 2 mm. longis apice subito attenuatis filiformibus, antheris rotundatis $\frac{1}{2}$ mm. in diametro utraque emarginatis; stylo conico $\frac{2}{3}$ mm. longo glabro.

Hab. Musha, leg. B. Hayata, ad 3800 ped. alt., Aprili. 1916.

Near *V. formosanum* Hay.; but differs from it in the much larger leaves with larger serration.

Viburnum subglabrum Hayata sp. nov. (Fig. 25) Frutex; ramuli teretes purpureo-rubescentes glabri. Folia opposita ad ramulos hornotinos 3-5 cm. longos 2 vel 4 disposita rotundato-cordata 8–9 cm. longa 5–6 cm. lata apice caudato-cuspidata basi tenuiter cordata margine tenuiter dentata vel serrata, serris brevissimis interdum ad mucrones reductis a se 5 mm. remotis, supra glabra subtus subglabra sed ad axillas venarum dense tomentosa, petiolis 5 mm. longis, stipulis nullis. Cymae terminales solitariæ vel 4-5 congestæ 2-3 cm. longæ, pedunculis $1\frac{1}{2}$ cm. longis glabris vel tenuiter hirsutis, pedicellis 2-3 mm. longis tenuiter hirsutis, bracteis caducissimis ignotis. Calycis tubus cum ovario 1 mm. longus $\frac{2}{3}$ mm. latus tenuiter hirsutus, lobis 5 oblongis 1 mm. longis margine ciliolatis. Corolla rotata, tubo brevissimo $\frac{1}{2}$ mm. longo, lobis 5 rotundatis $1\frac{2}{3}$ mm. longis 2 mm. latis apice rotundatis margine minute ciliolatis utraque pagine glabris basi leviter contractis. Stamina 5, filamentis glabris $1\frac{1}{2}$ mm. longis, antheris oblongo-cordatis 1 mm. longis $\frac{2}{3}$ mm. latis apice emarginatis basi lobatis; stylo glabro conico 1 mm. lato apice tenuiter 3-lobato.

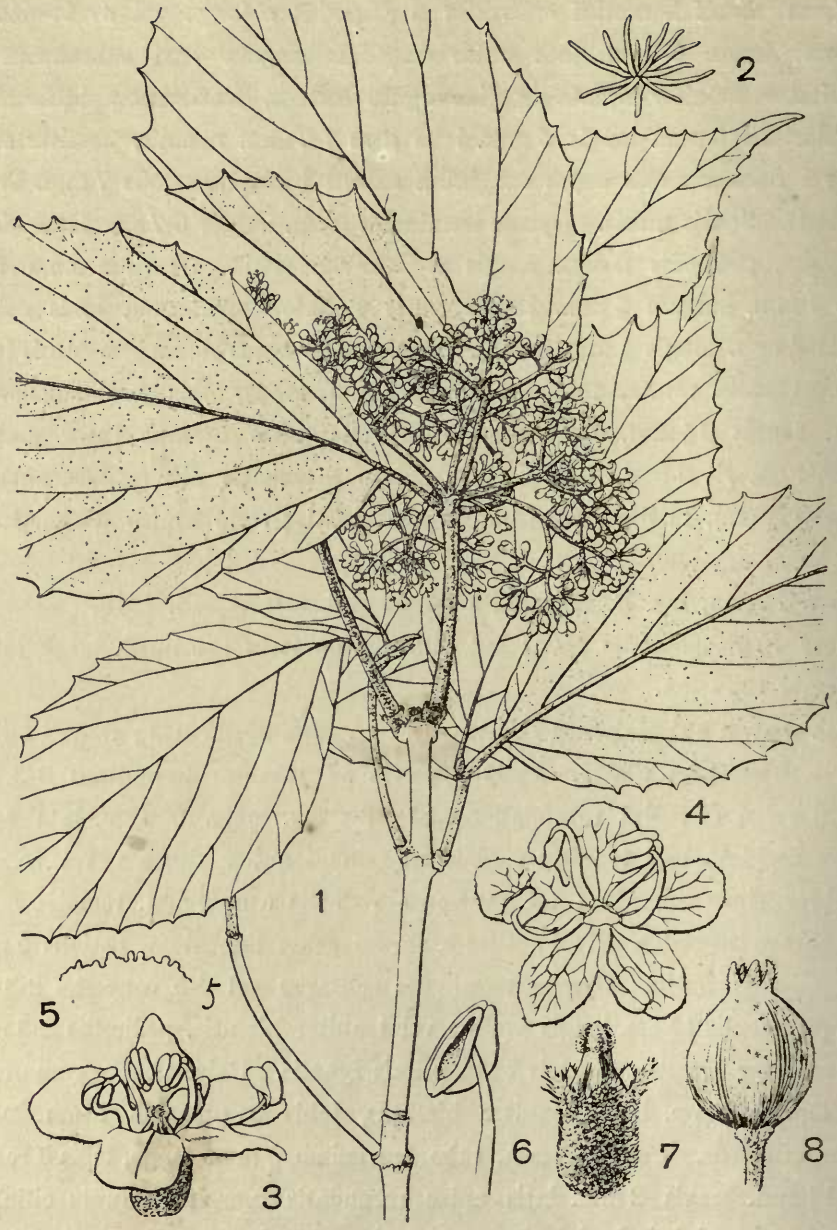


Fig. 24, *Viburnum mushaense* HAYATA; 1, the plant, ×¾; 2, a hair on the calyx; 3, a flower; 4, the same, seen from above; 5, margin of a corolla-lobe; 6, a stamen; 7, ovary; 8, a premature fruit.

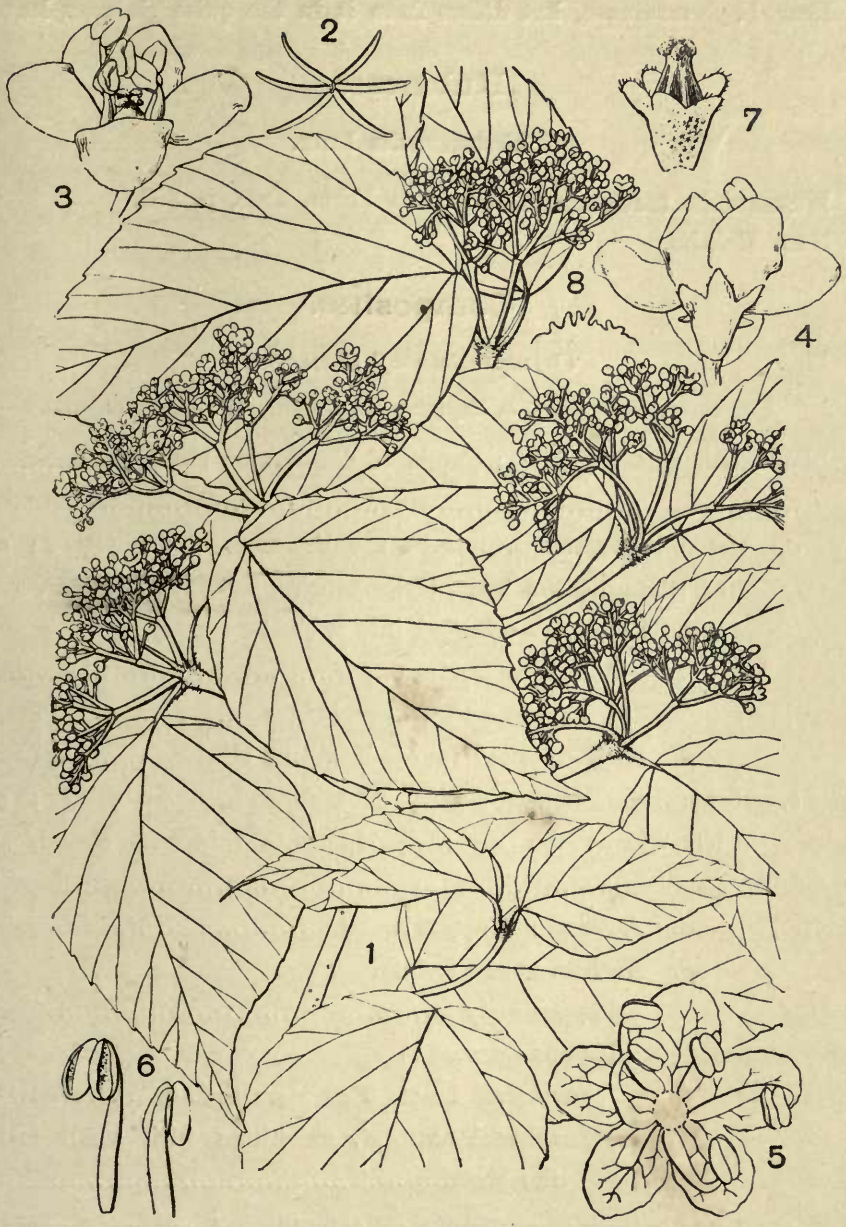


Fig. 25, *Viburnum subglabrum* HAYATA; 1, the plant ×⅔; 2, a hair on the calyx; 3, 4, 5, flowers, seen from different sides; 6, stamens, seen from different sides; 7, ovary; 8, margin of a corolla-lobe.

HAB. Giran, Shōkei, leg. S. SASAKI.

Near *V. formosanum*, but differs from it in the quite glabrous leaves.

Rubiaceæ.

Mussaenda LINN.

Mussaenda taiwaniana KANEHIRA Form. Tree. p. 303.

HAB. Holisha.

Compositæ.

Conspectus of Genera.

After HOFFMANN's *system, in* ENGLER's *Nat. Pfl.-fam. IV.—5, pp. 118–120.*

A. Plant without milky juice; corolla of disc-flowers not ligulate.....
.....TUBULIFLORÆ.

a. Heads homogamous, flowers tubuliformed, never yellow; anther sagittate at the base; style-branches subulate, hairy...Vernoniæ.

α. Heads not collected into a cluster

× Pappus 0.....*Ethulia.*

×× Pappus setaceous deciduous .....*Vernonia.*

β. Head collected into a head-like cluster.....*Elephantopus.*

b. Heads homogamous, flowers tubuliformed, never yellow; anther truncate at the base; style-branches subterete, obtuse, shortly papillose .....Eupatoricæ.

α. Anthers not appendiculate.....*Adenostemma.*

β. Anthers appendiculate.

Pappus scaly .....*Ageratum.*

Pappus setaceous.

Involucral bracts 6 or more than 6.....*Eupatorium.*

Involucral bracts 4, sometimes with small scales at the base.....*Mikania.*

c. Heads heterogamous liguli- or tubuliformed or, ray-flowers being wanted, homogamous; anthers obtuse at the base, subentire. Style-branches complanate, appendiculate.....Astereæ.

α. Heads with ligulate marginal flowers; margin-flowers same colored as disc-flowers.....*Solidago.*

β. Heads with 2—∞—series of ♀ with ligulate or filiformed corolla; pappus short or 0.

Fruit crowned with a cup.....*Grangea.*

Fruit not crowned with a cup.....*Dichrocephala.*

γ. Heads with ligulate margin-flowers, whose colour is different from that of disc-flowers.

Pappus reduced or 0.

Fruit without sticky ring at the apex...*Lagenophora.*

Fruit with a sticky ring at the apex.....*Myriactis.*

Pappus setaceous or in *A. indicus* nearly reduced.

Involucral bracts more than 2-series; ray-flowers in 1-series, lanceolate; appendage of style-branches lanceolate .....*Aster.*

Involucral bracts nearly 2-seried, ray-flowers linear in many series; appendage of style-branches mostly short, triangular .....*Erigeron.*

δ. Heads with filiformed or short ligulate margin-flowers. Pappus ∞ setaceous.

Fruit not compressed .....*Microglossa.*

Fruit compressed.....*Conyza.*

d. Heads homogamous or heterogamous, the outer ligulate. Anther-cells (except *Laggera*) tailed. Style various.....Inuleæ.

1. ♀ flowers filiformed.

1. Styles of ☿ flowers with thoroughly hairy branches.

Heads simple, not collected into a head-like cluster.

α. Pappus-setæ ∞.

Herb with narrow involucral bracts.

Anther tailed .....*Blumea.*

Anther not tailed .....*Laggera.*

Shrubs with wide involucral bracts. *Pluchea.*

β. Pappus 0 .....*Epaltes.*

Heads collected into a head-like cluster...*Sphæranthus.*

2. Styles of ☿ flowers mostly truncate at the apex and furnished with a terminal crown of hairs.

α. ☿ flowers all sterile.

Pappus-setæ deciduous connate at the base... ..... *Leontopodium.*

Pappus-setæ free at the base.....*Anaphalis.*

β. ☿ flowers all fertile .....*Gnaphalium.*

II. ♀ flowers ligulate .....*Carpesium.*

e. Heads homogamous or heterogamous. Style-branches with a crown of longer hairs. Anthers rounded at the base.

α. Pappus not hair-like.

I. Involucral bracts without scarious blades.

Receptacles with palcæ .....Helianthеæ.

Corolla of ♀ 0. Heads unisexual ...*Xanthium.*

Corolla advanced.

Fruit not compressed.

Inner involucral bracts concave embracing the marginal fruits. Pappus 0 ....*Siegesbeckia.*

Inner involucral bracts flat.

Palea very narrow .....*Eclipta.*

Palea wide.

Margin flowers ♀.....*Wedelia.*

Margin flowers neutral.....*Helianthus.*

Fruit dorsally compressed.

* Setæ with retrorse hairs.

Leaves alternate .....*Glossogyne.*

Leaves opposite .....*Bidens.*

** Setæ without retrorse hairs...*Synedrella.*

Receptacles without palea.....*Tagetes.*

II. Involucral bracts with scarious blades at the margin and apex. Pappus 0 or reduced.....Anthemideæ.

Heads with ray-flowers which are longer than involucral bracts .....*Chrysanthemum.*

Heads heterogamous, flowers all disciformed.

☿ flowers tetramerous.

Flower-heads stalked .....*Cotula.*

Flower-heads sessile *Centipida* (*Myriogyne*)

☿ flowers pentamerous.

Fruit not 5-costate; ♀ 1-seried. *Artemisia.*

Fruit 5-costate; ♀ 2-seried. *Crossostephium.*

i. Pappus hair-like .....Senecioneæ.

Heads homogamous. Style-branches with long acute appendage at the apex of the stigmatic line, without distinct crown of long hairs .....*Gynula.*

Heads homogamous or heterogamous; style-branches with a crown of hairs at the apex.

Heads homogamous .....*Cacalia.*

Heads heterogamous, involucral bracts more than six which are not at all or very slightly imbricate. ..... *Senecio.*

Heads heterogamous, involucral bracts more than 6 which are strongly imbricate .....*Ligularia.*

f. Heads with ♀ at the margin mostly sterile ray-formed, disc-flowers with unbranched style; anthers acuminate at the base. Receptacles without palea.....Calenduleæ.

g. Style thickened or furnished with a crown of hairs at the base of furcation .....Cynareæ.

Heads 1-flowered, collected into a head-like cluster.....*Echinops.*

Heads many-flowered, simple.

Filaments naked .....*Saussurea.*

Filaments verrucose, hairy or ciliate .....*Cirsium.*

h. Heads homogamous or heterogamous. Margin-flowers, if exist, 2-lipped; disc-flowers ray-formed, with deep-cleft limb or 2-lipped. .....Mutisieæ.

Upper lip of corolla 0, lower lip 5-lobed ..... *Ainsliæa.*

Upper lip of corolla 2–, lower lip 4 or 3-lobed..... *Gerbera.*

B. Plant with milky juice; corolla all ligulate ..... LIGULIFLORÆ.

Pappus-setæ feathery ..... *Picris.*

Pappus-setæ simply hairy, rough or smooth.

Achene rostrate.

Scape erect, 1-headed ..... *Taraxacum.*

Head paniculate or racemose ..... *Lactuca.*

Achene not rostrate.

Achene narrowed at the apex..... *Crepis.*

Achene truncate at the apex.

Fruit complanate..... *Sonchus.*

Fruit terete..... *Hieracium.*

Ethulia LINN.

Ethulia conyzoides LINN.; HAYATA Gen. Ind. Fl. Formos. p. 39.

The occurrence of this species in the island is rather doubtful.

Vernonia SCHREB.

Key to species.

1. Pappus very short or nearly none ..... 1. *V. Kawakamii.*
   Pappus-setae copious..... 2.
2. Trailing plant ..... 2. *V. Andersoni.*
   Erect plant..... 3.
3. Leaves whitish beneath..... 3. *V. chinensis.*
   Leaves not whitish beneath..... 4.
4. Leaves obovate-oblong 7 cm. long 2-3 cm. broad ..... 4. *V. gratiosa.*
   Leaves much-smaller oblong or linear 2-3 cm. long. ..... 5. *V. cinerea.*

1. **Vernonia Kawakamii** HAYATA (Pl. IV.) Gen. Ind. Fl. Formos. p. 41.

2. **Vernonia Andersoni** CLARKE; HAYATA l.c. p. 41.

2—*a*. **Vernonia Andersoni** CLARKE var. **albipappa** HAYATA n. v. Scandens, rami fulvescentes dense pubescentes. Folia lanceolata vel oblanceolata 8-10 cm. longa 2-3 cm. lata apice acuta ad summum aristata basi cuneata margine

integra chartacea supra glabra subtus fulvo-pubescentia ; petiolis 5 mm. longis. Flores ut typica ; sed pappus albo-fulvescens.

Hab. Nantō : Shinnenshō, leg. Y. Shimada.

Differs from the type in the whitish pappus-hairs and in the less hairy corolla and styles.

3. **Vernonia chinensis** Less.; Hayata l.c. p. 41.
4. **Vernonia gratiosa** Hance ; Hayata l.c. p. 41.
5. **Vernonia cinerea** Less.; Hayata l.c. p. 41.

Elephantopus Linn.

Key to species.

1. Head-clusters sessile spicately arranged..... 1. *E. spicata.*
   Head-clusters long pedunculate ..... 2.
2. Flowers purple ..... 2. *E. scabra.*
   Flowers white ..... 3. *E. mollis.*

1. **Elephantopus spicatus** B. Juss.; Hayata l.c. p. 39.
2. **Elephantopus scaber** Linn.; Hayata l.c. p. 39.
3. **Elephantopus mollis** H.B.K.; Hayata l.c. p. 39.

Adenostemma Forst.

Adenostemma viscosum Forst ; Hayata l.c. p. 37.

Ageratum Linn.

Ageratum conyzoides Linn.; Hayata l.c. p. 37.

Eupatorium Linn.

Key to species.

1. Scandent and somewhat trailing plants..... 2.
   Erect plants ..... 3.
2. Leaves triangular-ovate deeply dentate..... 1. *E. gracillimum.*
   Leaves ovate-oblong shallowly dentate ..... 2. *E. Tashiroi.*
3. Leaves tripartite .....3. *E. formosanum* ; 4. *E. quasitripartitum.*
   Leaves simple ..... 4.

4. Leaves broadly ovate ..... 5. *E. Reevesii.*
   Leaves lanceolate or linear ..... 5.
5. Leaves lanceolate acuminate ..... 6. *E. tozanensis.*
   Leaves linear ..... 7. *E. Lindleyanum.*

1. **Eupatorium gracillimum** Hayata, (Pl. V.) l.c. p. 39.

2. **Eupatorium Tashiroi** Hayata l.c. p. 39.

3. **Eupatorium formosanum** Hayata l.c. p. 39.

4. **Eupatorium quasitripartitum** Hayata sp. nov. Herba basi lignosa scandens vel erecta tenuiter hirsuta ramosa. Folia oblonga vel trilobata 7-8 cm. longa 3-5 cm. lata apice acuminata vel obtusa basi acuta vel truncata margine serrata, serris obtusis, utraque pagine tenuiter hirsuta vel subglabrata, petiolis 7–10 mm. longis. Capitula dense cymosa ramosissima, pedicellis ultimis 1–2 mm. longis hirsutis, bracteolis 2–3 instructis. Involucri bracteæ 2–3-seriatim dispositæ, interioribus longioribus spathulatis 3–4 mm. longis 1 mm. latis apice rotundatis basi attenuatis glabris. Flores 5–6. Achænium pentagonum in sectione 5-costatum ad costas hirsutum nigricans; pappi setae 2-3 mm. longæ scabræ subalbæ. Corolla tubuloso-campanulata 3–3½ mm. longa 1–1½ mm. lata glabra apice 5-lobata, lobis breve triangularibus ½ mm. longis; styli ramis longe exsertis.

Hab. Hokuto, Taihoku, Tamsui, Kelung, Kusshaku.

Near *E. formosanum* Hay., but differs from it in having much obtuser trilobed leaves.

5. **Eupatorium Reevesii** Wall.; Hayata l.c. p. 39.

Hab. inter Seisui et Guukutsu, leg. B. Hayata et S. Sasaki, Mai. 1917; Tannō, leg. B. Hayata.

Note: Leaves fleshy lusterless above; involucre green; styles and corolla white.

6. **Eupatorium tozanense** Hayata sp. nov. Herba basi lignosa erecta subglabra. Folia lanceolata 16 cm. longa 4 cm. lata apice acuminata vel acuminatissima, acuminibus linearibus, basi obtusa margine grosse serrata membranacea utraque pagine hirsuta, petiolis 8-10 mm. longis. Capitula dense cymosa, pedicellis dense fulvo-hirsutis, bracteolis minutis lanceolatis multis instructis. Involucrum anguste conico-campanulatum 5 mm. longum; bracteis involucri 3-seriatim dispositis, interioribus longioribus linearibus vel lanceolatis

5–6 mm. longis apice obtusissimis pauce hirsutis. Flores 6-7. Ovarium cylindricum $2\frac{1}{2}$ mm. longum apice truncatum basi obtusum subglabrum. Pappi setæ copiosæ $3\frac{1}{2}$ mm. longae scabrae. Corolla tubulosa apice plus minus latior 4 mm. longa extus medio pauce hirsuta apice 5-lobata, lobis oblongo-triangularibus; styli ramis longe exsertis. Achænium maturum ignotum.

Hab. Arisan: Tōzan, leg. T. Sōma.

Near *E. Lindleyanum*; but differs from it in the much broader leaves.

7. **Eupatorium Lindleyanum** DC.; Hayata l.c. p. 39.

Mikania Willd.

Mikania scandens Willd.; Hayata l. c. p. 40.

Solidago Linn.

Solidago Virga-aurea Linn.; Hayata l. c. p. 41.

Grangea Adans.

Grangea maderaspatana Poir.; Hayata l. c. p. 39.

Dichrocephala DC.

Dichrocephala latifolia DC.; Hayata l. c. p. 39.

Lagenophora Cass.

Lagenophora Billardieri Cass.; Hayata l. c. p. 40.

Myriactis

Myriactis longipedunculata Hayata (Pl. VI.) l. c. p. 40.

Aster Linn.

Conspectus of species.

1. Pappus none or very much reduced .....1. *A. indicus.*
   Pappus copious .....2.
2. Leaves cordately oblong or cordate .....2. *A. formosana.*
   Leaves linear margin entire .....3.
   Leaves oblong lanceolate more or less serrate never entire.....6.
3. Leaves ciliate at the margin .....4.

Leaves not ciliate at the margin .....5.

4. Leaves ciliate at the margin, but glabrous on both sides...3. *A. Oldhami.*
Leaves hirsute on both sides .....4. *A. omerophyllus.*

5. Pappus reddish, stronger than in the followiug species...5. *A. rufopappus.*
Pappus brownish .....6. *A. batakensis.*

6. Involucral bracts 1–2-seriate, nearly equal .....7. *A. morrisonensis.*
Involucral bracts 3–4-seriate, very unequal.....7.

7. Leaves oblong scabrous gradually passing into bract-like small leaves in the inflorescence, pappus-hairs stronger than in the other species.....
8. *A. baccharoides.*
Leaves various villose or glabrous, scabrous or smooth; inflorescence without bract-like small leaves. Pappus different from the preceding species in the anatomical characters .....8.

8. Branches and leaves all brownish villose.....9. *A. lasioclada.*
Branches and leaves not villose .....9.

9. Leaves very scabrous; cymes terminal, much contracted; heads nearly clustered .....10. *A. scaberrimus.*
Leaves glabrous or slightly hairy, sometimes slightly scabrous; cymes usually expanded.....11. *A. trinervius.*
(Branches scandent or hanging.....12. *var. scandens.*)

1. **Aster indicus** Linn.; Hayata l.c. p. 37.

2. **Aster formosana** Hayata sp. nov. Caulis 60–80 cm. longus subglaber. Folia triangulari-ovata 14 cm. longa 9 cm. lata apice cuspidato-acuminata basi leviter cordata vel truncato-cordata margine grosse dentata, dentibus triangularibus apice setulosis, basi et cuspide integra, utraque pagine glabra subtus pallidissima, petiolis 7 cm. longis. Capitula paniculata, paniculis 14 cm. longis 9–10 cm. latis, capitula cum fl. marginalibus 1 cm. in diametro, bracteis involucri 2-seriatim dispositis, interioribus linearibus $4\frac{1}{2}$ mm. longis 1 mm. latis apice obtusis. Fl. ♀: marginales liguliformes 1-seriatim dispositi; ovarium hirsutum; pappi setæ copiosæ 2-3 mm. longæ; corollæ tubo 2 mm. longo, limbo liguliformi lineari $5\frac{1}{2}$ mm. longo $1\frac{1}{3}$ mm. lato apice obtuso basi attenuato. Fl. disci ☿: corollæ tubo 2-3 mm. longo extus breve hirsuto, limbo fere 5-partito, partibus linearibus $3\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis valde recurvis.

Achænium ignotum.

Aster scabra HAYATA (non THUNB.) Gen. Ind. p. 37.

Differs from *Aster scabra* by the anatomical characters of the pappus-hairs and by the leaf-base which is not at all decurrent to the petiole.

3. **Aster Oldhami** HEMSL. (Fig. 26–5); HAYATA, l.c. p. 37.

4. **Aster omerophyllus** HAYATA sp. nov. (Fig. 26–6). Annua; caulis erectus 30–40 cm. longus toto longitudine foliatus setuloso-hirsutus ramosus. Folia basalia lineari-spathulata 6 cm. longa 6 mm. lata apice obtusa basi longe attenuata margine subintegra utraque pagine setuloso-hirsuta margine ciliolata. Folia superiora linearia 3 cm. longa 2 mm. lata sessilia. Capitula ad ramos terminalia cum floribus marginalibus 3 cm. in diametro, bracteis involucri 1-2-seriatim dispositis linearibus 7 mm. longis 1 mm. latis margine et dorso setoso-hirsutis apice acutis. Fl. ♀ marginales liguliformes 1-seriatim dispositi; pappi setæ 0; corollæ tulo $1\frac{1}{2}$ mm. longo, limbo oblanceolata 1 cm. longo $2\frac{1}{2}$ mm. lato apice obtuso obscure 3-dentato. Fl. disci. ☿: ovarium dense hirsutum; pappi setæ copiosæ 1-seriatim sitæ 3–4 mm. longæ scabræ; corolla tubuloso-campanulata 4 mm. longa extus plus minus hirsuta apice 5-lobata, lobis oblongo-triangularibus 1 mm. longis. Achænium maturum ignotum.

HAB. inter Taroko et Shinjō, leg. B. HAYATA, Aprili. 1917.

Near *Aster Oldhami* HEMSL.; but differs from it by the leaves, hirsute at the margin and on both surfaces.

5. **Aster rufopappus** HAYATA sp. nov. (Fig. 26–3) Annua. Caulis erectus 50–60 cm. altus ramosus toto longitudine foliatus subglaber. Folia linearia vel spathulata 3 cm. longa 3–4 mm. lata apice obtusa vel acuta basi attenuata sessilia margine integra utraque pagine breve hirsuta, pilis validis. Capitula ad apicem ramulorum sita cum floribus marginalibus 2 cm. in diametro. Involucri bracteæ lineares 2-seriatim dispositæ hirsutæ lineares 7 mm. longæ 1 mm. latæ apice acuminatissimæ extus dense hirsutæ intus glabræ. Fl. ♀ marginales liguliformes 1-seriatim dispositi; ovario dense hirsuto; pappo palæformi gamophyllo $\frac{1}{2}$ mm. longo; corollæ tubus 2 mm. longus, limbo liguliformi lanceolato 1 cm. longo $2\frac{1}{2}$ mm. lato apice basique obtuso. Fl. disci. ☿: ovarium obovoideum dense hirsutum 1 mm. longum; pappi setæ copiosæ rubescentes 3–4 mm. longæ; corollæ tubuloso-campanulatæ 5 mm. longæ, limbo 5-partito.

Achænium valde complanatum obovatum $2\frac{1}{2}$ mm. longum $1\frac{2}{3}$ mm. latum hirsutum. Pappi setæ rubescentes 4 mm. longæ.

Hab. Sansaho.

Aster altaicus Hayata (non Willd.) Gen. Ind. p. 37.

Differs from *A. altaicus* Willd. by the more reddish pappus of a different anatomical character.

6. **Aster batakensis** Hayata sp. nov. (Fig. 26-2) Annua 50–80 cm. longa, caulis subglaber ramosus toto longitudine foliosus. Folia linearia vel spathulata 4 cm. longa 4–5 mm. lata apice obtusa vel acuta basi attenuata utraque pagine subglabra margine integra sessilia; folia superiora minora bracteiformia. Capitula ad apicem ramulorum terminalia, cum floribus marginalibus 4 cm. in diametro, involucri bracteis circ. 1-seriatim dispositis lineari bus 1 cm. longis $\frac{2}{3}$ mm. latis extus hirsutis acuminatis. Fl. ♀ : marginales 1-seriatim dispositi liguliformes, tubo 2 mm. longo, limbo lanceolato 14 mm. longo $3\frac{1}{2}$ mm. lato apice brevissime 3-dentato basi plus minus contracto; pappi paleiformes connati $\frac{1}{2}$ mm. longi. Fl. disci. ♀ : ovarium dense hirsutum; pappi setæ copiosæ 3 mm. longæ; corolla tubuloso-campanulata 4 mm. longa apice 5-lobata, lobis triangularibus $\frac{2}{3}$ mm. longis. Achænium complanatum obovatum hirsutum $2\frac{1}{2}$ mm. longum apice rotundatum basi cuneatum; pappi setæ copiosæ scabræ 2–3 mm. longæ.

Hab. inter Shinjō et Batakan, leg. B. Hayata et S. Sasaki Aprili. 1917.

Near *A. rufopappus* Hay.; but differs from it by the brownish pappus-hairs.

7. **Aster morrisonensis** Hayata sp. nov. Caulis 20–30 cm. longus simplex gracilis glaber toto longitudine foliatus. Folia lanceolata membranacea 6 cm. longa 1 cm. lata apice acuminata basi attenuata margine remote serrata supra minute hirsuta subtus ad nervos hirsuta subsessilia. Capitula cymose disposita, cymis 3–4 cm. longis totiusque latis; bracteis involucri 2-seriatim dispositis, interioribus lineari bus 3 mm. longis $\frac{2}{3}$ mm. latis margine dorsoque barbato-ciliolatis apice obtusissimis. Fl. ♀ : marginales 1-seriatim dispositi. pappi setæ $2\frac{1}{2}$ mm. longæ scabræ; corollæ tubus $1\frac{1}{3}$ mm. longus, limbo liguliformi lanceolato 6 mm. longo $1\frac{1}{2}$ mm. lato apice obtusissimo 3-crenulato. Fl. disci. ♀ : corollæ tubuloso-campanulatæ, tubo $1\frac{1}{2}$ mm. longo, limbo $1\frac{1}{2}$ mm.

longo a medio sursum 5-lobato, lobis elongato-triangularibus 1 mm. longis. Achænium maturum ignotum.

Hab. Monte Morrison, ad 11000 ped. alt.; leg. S. Sasaki, Oct. 1909.

Near *A. trinervius*; but differs from it by the very much slender form with very much smaller lanceolate leaves.

8. **Aster baccharoides** Steetz. (Fig. 26–5); Hayata l.c. p. 37.

9. **Aster lasioclada** Hayata (Fig. 26–1) sp. nov. Caulis molle fulvo-tomentosus simplex vel ramosus. Folia ovato-oblonga 6 cm. longa $2\frac{1}{2}$ cm. lata apice obtusa ad summum mucronata basi acuta vel obtusa utraque pagine fulvo-velutinoso-tomentosa margine subintegra vel remote mucronibus instructa, petiolis 5 mm. longis velutinoso-tomentosis. Capitula laxe cymosa, bracteis involucri interioribus linearibus 5 mm. longis $\frac{2}{3}$ mm. latis apice acuminatis basi attenuatis. Capitula cum floribus marginalibus $1\frac{1}{2}$ cm. in diametro. Fl. ♀ : marginales liguliformes 1–2 seriatim dispositi; corollæ tubus 3 mm. longus, limbo liguliformi lanceolato 7 mm. longo $1\frac{2}{3}$ mm. lato apice obtuso. Fl. disci. ♀ : ovarium hirsutum; pappi setæ 5 mm. longæ scabræ; corolla tubuloso-campanulata $4\frac{1}{2}$ mm. longa, tubo 2 mm. longo, limbo $2\frac{1}{2}$ mm. longo apice 5-lobato, lobis lineari-triangularibus $1\frac{1}{2}$ mm. longis. Achænium maturum ignotum.

Hab. Nantō: Kashigatani, leg. G. Nakahara, Feb. 1907; inter Holisha et Suisha.

Near *Aster trinervius*, but differs from it by the soft tomentose leaves and branches.

10. **Aster scaberrimus** Hayata sp. nov. Caulis subsimplex 40–60 cm. altus scaber toto longitudine foliatus. Folia oblongo-lanceolata vel oblanceolata 7 cm. longa 2 cm. lata apice acuminata obtusa vel acuta basi attenuata subsessilia margine serrata supra scaberrima subtus scabra plus minus hirsuta. Capitula dense cymosa, cymis terminalibus 2 cm. longis totiusque latis. Capitula cum floribus marginalibus 7–8 mm. in diametro; bracteis involucri imbricatis 3-seriatim dispositis, interioribus spathulatis $3\frac{1}{2}$ mm. longis 1 mm. latis apice obtusissimis margine erosis extus hirsutis. Fl. ♀ : marginales liguliformes 2-seriatim dispositi; ovarium hirsutum; pappi setæ 3 mm. longæ scabræ; corollæ tubus $1\frac{1}{3}$ mm. longus, limbo liguliformi $3\frac{1}{2}$ mm. longo $\frac{2}{3}$ mm.

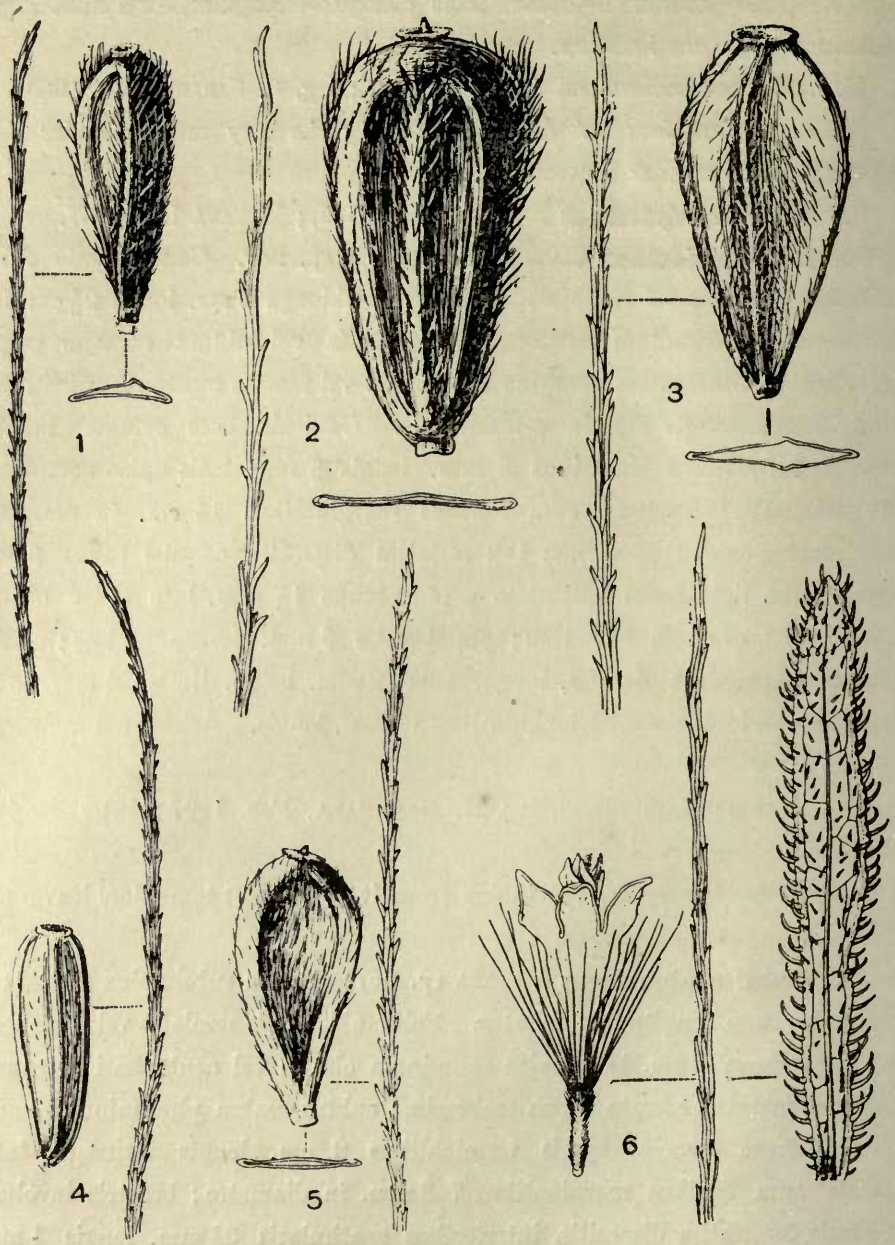


Fig. 26; 1, *Aster lasioclada* HAYATA; 2, *Aster batakensis* HAYATA; 3, *Aster rufopappus* HAYATA; 4, *Aster baccharoides*; 5, *Aster Oldhami* HEMSL.; 6, *Aster omerophyllus* HAYATA.

lato lanceolato apice truncato breve 3-crenulato denticulato. Fl. disci. ♀ : tubulosi 3½ mm. longi. Achænium maturum ignotum.

Hab. in Monte Morrison, leg. T. Kawakami et U. Mori, Oct. 1906.

Near *Aster trinervius*, but differs from it by the much contracted cymes and by the very much scabrous leaves.

10. **Aster trinervius** Roxb.; Hayata l.c. p. 37.

11. **Aster trinervius** Roxb. var. **scandens** Hayata n.v.

Hab. Arisan.

Erigeron Linn.

Key to species.

Stem branched. Heads many racemose or paniculate.....1. *E. linifolius.*
Stem simple not branched. Heads terminal solitary...2. *E. morrisonensis.*

1. **Erigeron linifolius** Willd.; Hayata l.c. p. 39.
2. **Erigeron morrisonensis** Hayata l.c. p. 39.

Microglossa DC.

Microglossa volubilis DC.; Hayata l.c. p. 40.

Conyza Less.

Key to species.

Leaves deeply laciniate ..... 1. *C. ægyptiaca.*
Leaves not laciniate serrate ..... 2. *C. japonica.*

1. **Conyza ægyptiaca** Ait.; Hayata l.c. p. 38.
2. **Conyza japonica** Less.; Hayata l.c. p. 38.

Blumea DC.

Key to species.

1. Leaves silky or cottony beneath..... 2.
   Leaves glabrous or hairy beneath, but neither silky nor cottony..... 5.
2. Leaves brown cottony beneath..... 1. *B. balsamifera.*
   Leaves white silky or cottony ..... 3.
3. Stem unbranched. Head-clusters sessile ..... 4.
   Stem branched. Head-clusters pedunculate..... 2. *B. hieracifolia.*

4. Head-clusters terminal ..... 3. *B. gnaphalioides.*
   Head-clusters terminal or axillary, racemose ..... *B. sericans.*
5. Leaves deeply laciniate..... 5. *B. laciniata.*
   Leaves serrate dentate, but not laciniate ..... 6.
6. Climbing ..... 6. *B. chinensis.*
   Erect ..... 7.
7. Leaves membranaceous ..... 8.
   Leaves chartaceous .....11.
8. Leaves dentate ..... 9.
   Leaves irregularly serrulate.....10.
9. Leaves densely hairy beneath ..... 7. *B. lacera.*
   Leaves thinly hairy beneath ..... 8. *B. onnaensis.*
10. Heads 5 mm. long ..... 9. *B. okinawensis.*
    Heads 7-8 mm. long ..... 10. *B. leptophylla.*
11. Heads 7 mm. long ..... 11. *B. myriocephala.*
    Heads 10 mm. long ..... 12. *B. conspicua*

1. **Blumea balsamifera** DC.; HAYATA l.c. p. 37.

2. **Blumea hieracifolia** DC.; HAYATA l.c. p. 37.

3. **Blumea gnaphalioides** HAYATA sp. nov. Caulis simplex 30-40 cm. longus. Folia radicalia spathulata 9 cm. longa $2\frac{1}{2}$ cm. lata apice rotundata vel obtusissima basi attenuata sessilia margine irregulariter denticulata membranacea supra hirsuta subtus argenteo-tomentosa; folia caulina minora. Capitula densissime cymosa, cymis terminalibus solitariis 2 cm. longis totiusque latis; capitula cylindrico-campanulata 5 mm. longa et lata, bracteis involucri 3-seriatim dispositis, interioribus linearibus $5\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis denticulatis barbatis. Fl. ♀ : marginales multi-seriatim dispositi filiformes $3\frac{1}{2}$ mm. longi; stylo paullo exserto. Fl. ♀ : centrales circ. 10; corolla tubulosa $3\frac{1}{2}$ mm. longa apice breve 5-lobata, lobis rotundato-triangularibus $\frac{1}{3}$ mm. longis margine hirsutis. Achænium cylindricum $\frac{2}{3}$ mm. longum; pappi setæ 4 mm. longae 1-seriatim dispositæ.

HAB. Yayeyama, leg. Y. TASHIRO, 1887.

Near *B. sericans* HOOK. f., but differs from it by the anatomical characters of the pappus-hairs and by the capitate heads on the apex of the stem.

4. **Blumea sericans** HOOK. f.; HAYATA l.c. p. 38.

5. **Blumea laciniata** DC.; HAYATA l.c. p. 38.

6. **Blumea chinensis** DC.; HAYATA l.c. p. 37.

7. **Blumea lacera** DC.; HAYATA l.c. p. 38.

8. **Blumea onnaensis** HAYATA sp. nov. Herba annua 40-50 cm. longa tenuiter hirsuta. Folia oblonga vel obovato-oblonga membranacea cum petiolis 6-8 cm. longa 3 cm. lata apice acuta basi subito ad petiolum alatum longe attenuata margine irregulariter dentata utraque pagine tenuiter hirsuta subsessilia. Capitula racemosa vel paniculata cylindrico-globosa 7 mm. longa totiusque lata, bracteis involucri 5–6-seriatim dispositis, interioribus linearibus 6 mm. longis $\frac{2}{3}$ mm. latis extus hirsutis apice barbatis acutis vel obtusis 1-costatis leviter purpureis. Fl. ♀ : multi-seriatim dispositi; corolla filiformis $3\frac{1}{2}$ mm. longa apice truncata; pappi setæ albæ 1-seriatim dispositæ 4 mm. longæ scabræ. Fl. ♀ : centrales circ. 20; corollæ tubuloso-filiformes $4\frac{1}{2}$ mm. longæ $\frac{1}{2}$ mm. latæ apice 5-lobatæ, lobis oblongo-triangularibus $\frac{1}{2}$ mm. longis margine hirsutis. Achænium maturum ignotum.

HAB. Loo-choo: Onna.

9. **Blumea okinawensis** HAYATA sp. nov. Herba annua 30-40 cm. alta erecta haud vel pauce ramosa. Folia radicalia vel caulina membranacea, inferiora obovato-oblonga 12 cm. longa $5\frac{1}{5}$ cm. lata apice acuta vel obtusa basi gradatim attenuata subsessilia ad petiolum subnullum abeuntia margine irregulariter denticulata membranacea utraque pagine tenuissime hirsuta; caulina minora. Capitula cymosa vel paniculata, pedicellis ultimis 5 mm. longis hirsutis; capitula cylindrico-globosa 7 mm. longa totiusque lata; involucri bracteis multi-seriatim dispositis, exterioribus brevioribus triangularibus, interioribus lincaribus 5 mm. longis 1 mm. latis apice triangulari-acutis extus dorso margineque hirsutis. Fl. ♀ : marginales ∞-seriatim dispositi; ovarium cylindricum hirsutum $\frac{2}{3}$ mm. longum; pappi setæ 1-seriatim dispositæ $2\frac{1}{2}$ mm. longæ albæ scabræ; corolla filiformis 2 mm. longa. Fl. ♀ : corolla tubuliformis 2 mm. longa $\frac{1}{4}$ mm. lata apice 5-lobata, lobis oblongo-triangularibus $\frac{1}{5}$ mm. longis. Achænium ignotum.

HAB. Loo-choo: Naha, leg. Y. TASHIRO, mai. 1887.

Near *Blumea lacera* DC.; but differs from it by the leaves with attenuate base.

10. **Blumea leptophylla** Hayata sp. nov. Herba suffrutescens 50-60 cm. longa hirsuta obovato-oblonga vel oblanceolata 10-20 cm. longa 3-7 cm. lata apice acuta basi longe attenuata ad petiolum subnullum abeuntia margine irregulariter denticulata mucronibus remote instructa tenuiter membranacea utraque pagine tenuiter hirsuta. Capitula paniculata, paniculis 10-20 cm. longis, pedicellis 1 cm. longis hirsutis; capitula cylindrico-globosa 1 cm. longa et lata; bracteis involucri 3-4-seriatim dispositis exterioribus brevioribus interioribus lineari-lanceolatis 6 mm. longis acuminatis extus breve glanduloso-hirsutis. Fl. ♀: marginales multi-seriatim dispositi; corolla filiformes 4½ cm. longa; pappi setæ 5-6 mm. longæ corollas superantes. Fl. ♀: centrales 15-20; corolla tubuliformis 5 mm. longa ½ mm. lata apice 5-lobata, lobis oblongis obtusis glanduloso-hirsutis. Achænium maturum ignotum.

Hab. Shintiku, Goshizan, leg. U. Mori, Jan. 1907, (typus); Karapin, leg. B. Hayata, Jan. 1912.

Near *Blumea lacera* DC.; but differs from it in having much thinner leaves covered with short glandular hairs.

11. **Blumea myriocephala** DC.; Hayata l.c. p. 38.

12. **Blumea conspicua** Hayata l.c. p. 38.

Laggera Sch.-Bip.

Laggera angustifolia Hayata sp. nov. *L. alata* Hayata (non Sch. Bip.) Gen. Ind. p. 40. Caulis basi lignosus 50-60 cm. longus rectus erectus simplex toto foliatus anguste alatus. Folia lineari-spathulata 8 cm. longa 1 cm. lata margine mucronibus remote instructa apice acuta basi longissime attenuata ad alam caulis decurrentia utraque pagine brevissime hirsuta. Capitula ad folia superiora axillaria solitaria pedunculata nutantia, pedunculis plus minus alatis dense brevissime fulvo-hirsutis medio bracteis singulis lanceolatis instructis. Involucrum late globosum cum floribus 1 cm. longum totiuque latum; bracteis ∞-seriatim dispositis, exterioribus brevioribus 1–3 mm. longis triangularibus lanceolatis linearibus extus hirsutis apice obtusis vel acutis, interioribus longioribus linearibus minus hirsutis apice acuminatissimis 1 cm. longis. Fl. ♀: marginales; multi-seriatim dispositi; ovarium 1 mm. longum cylindricum hirsutum; pappi setæ 5 mm. longæ subalbæ scabræ; corolla filifor-

mis 5 mm. longa apice 3-lobata glabra. Fl. ♀ : centrales 15–20 ; corolla 7 mm. longa ½ mm. lata apice 5-lobata, lobis elongato-triangularibus ½ mm. longis acutis. Achænium ignotum.

Hab. Nantō ; Niitakayama.

Near *Laggera alata* Sch.-Bip.; but differs from it in the much narrower linear leaves.

Pluchea Cass.

Pluchea indica Less.; Hayata l.c. p. 40.

Epaltes Cass.

Epaltes australis Less.; Hayata l.c. p. 39.

Sphaeranthus Linn.

Sphaeranthus suberiflorus Hayata sp. nov. (Pl. VII. et Fig. 27) Herba lignosa ramosissima, ramis toto foliatis alatis. Folia obovata 3-3½ cm. longa 1½–2 cm. lata apice obtusissima vel ad summum mucronata basi attenuata longe ad alam ramorum attingentia margine brevissime serrulata utraque pagine breve hirsuta. Capitula in glomerulum globosum aggregata glomerulo 5-6 mm. in diametro pedunculato, pedunculo 5 mm. longo oppositifolio; receptaculum glomeruli globosum 2 mm. in diametro ; capitulum fere sessile vel brevissime pedicellatum, pedicellis ½ mm. longis, obconico-semiglobosum 2 mm. longum totiusque latum basi bracteolis minutis 1–2 instructum, bracteis involucri 1-seriatim dispositis obovato-spathulatis 2 mm. longis ⅔ mm. latis apice truncatis et denticulatis ad centrum mucronatis glabris. Fl. ♀ : marginales 2–3 seriatim dispositi ; ovarium obovoideo-cylindricum ¾ mm. longum ¼ mm. latum ferrugineo-hirsutum ; pappi 0 ; corolla

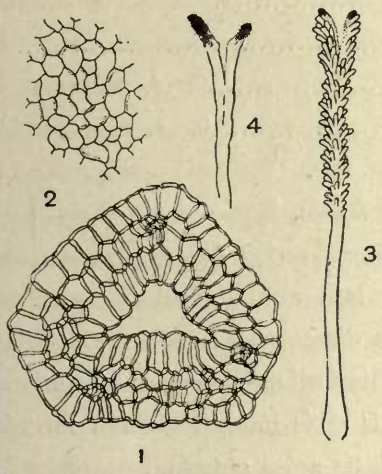


Fig. 27, *Shaeranthus suberiflorus* Hayata ; 1, transverse section of a suberiferous portion of a corolla of a female flower ; 2, a portion of the same, seen from surface ; 3, a style of a ♀ flower ; 4, a style of a female flower.

cylindrica 1¼ mm. longa a basi usque ad medium suberifera dilatata ⅓ mm. lata apice contracta, partibus contractis ½ mm. longis ⅕ mm. latis glabris. Fl. ♀ : centrales 2 vel 1 ; corolla glabra ; tubo ⅔ mm. longo ½ mm. lato, limbo 1 mm. longo ½ mm. lato apice 5-lobato, lobis oblongo-triangularibus ½ mm. longis. Achænium maturum ignotum.

Hab. Shōliūkiūtō, leg. G. Nakahara.

Near *Sphæranthus africanus*, but differs from it by the quite obtuse leaves, by the corky tubes of both ♀ and ♀ flowers, and in the branched stigma of the ♀-flowers.

Leontopodium Br.

Leontopodium microphyllum Hayata l.c. p. 40.

Anaphalis DC.

Key to species.

1. Leaves linear, acute at the apex .....1. *A. morrisonicola.*
   Leaves spathulate, obtuse at the apex .....2.
2. Heads less than 5 mm. long .....2. *A. buisanensis.*
   Heads 10 mm. long .....3. *A. Nagasawai.*

1. **Anaphalis morrisonicola** Hayata sp. nov. Perennis basi lignosa 14 cm. longa ramosa. Folia linearia 2 cm. longa 2 mm. lata apice obtusa basi attenuata integra supra glabra subtus dense adpresse sericeo-lanata sessilia apice obtusa basi attenuata. Capitula laxe cymosa late semi-globosa 7–8 mm. in diametro. Involucrum semi-globosum 7 mm. in diametro, bracteis multi-seriatim dispositis, exterioribus minoribus ovatis, interioribus majoribus obovatis 4 mm. longis 2 mm. latis apice obtusis basi cuneatis albis integris glabris, intimis angustioribus spathulatis 3 mm. longis 1 mm. latis apice obtusis basi cuneatis glabris. Fl. ♀ : ignoti. Flores in specimine nostro omnes ♀ steriles ; corolla tubulosa apice campanulata dilatata 3 mm. longa 1½ mm. lata apice 5-lobata, lobis triangularibus ; pappi setæ albæ deciduæ scabræ apice plus minus clavatæ.

Hab. Mt. Morrison.

Distinguishable from *A. margaritacea* var. *angustifolia* by the anatomical structure of the pappus-hairs.

2. **Anaphalis buisanensis** HAYATA sp. nov. Perennis 10 cm. alta ramosa sericeo-lanata. Folia spathulata 22 mm. longa 5 mm. lata apice acuta basi attenuata sessilia supra sparse subtus dense sericeo-lanata; folia caulina superiora linearia 1 cm. longa 2 mm. lata. Capitula laxe cymosa. Involucrum late obconico-campanulatum 5 mm. longum 7 mm. latum, bracteis 3–4-seriatim sitis, exterioribus brevioribus ovatis, interioribus obovato-spathulatis 4 mm. longis $1\frac{1}{3}$ mm. latis apice acutis ad summum obtusis basi plus minus attenuatis albicantibus, intimis angustioribus linearibus 3 mm. longis $\frac{1}{3}$ mm. latis apice acutis basi attenuatis. Fl. ♀ : ∞; corolla filiformis $2\frac{1}{2}$ mm. longa. Achænium maturum ignotum. Pappi setæ copiosæ albæ scabræ $2\frac{1}{2}$ mm. longæ.

HAB. Buyesan.

3. **Anaphalis Nagasawai** HAYATA l.c. p. 37.

Gnaphalium LINN.

Key to species.

1. Head-clusters solitary terminal on the scape-like stem, or axillary, sessile, or spicate.....2.
   Head-clusters at the apex of the branches of the stem or in contracted cymes .....5.
2. Leaves nearly radical, scape nearly leafless. Head-clusters terminal solitary. ..... 1. *G. japonicum.*
   Stem leafy up to the apex .....3.
3. Head-clusters terminal or axillary spicately arranged .....4.
   Head-clusters solitary terminal; leaves linear .....2. *G. lineare.*
4. Leaves linear .....3. *G. Morii.*
   Leaves spathulate .....4. *G. indicum.*
5. Heads pedunculate, not clustered.....5. *G. niitakayamensis.*
   Heads clustered or densely cymose .....6.
6. Leaves linear usually glabrous above, but cottony below....6. *G. hypoleucum.*
   Leaves spathulate or linear, densely hairy on both sides .....7.
7. Leaves spathulate .....7. *G. formosanum.*
   Leaves linear .....8. *G. hololeucum.*

1. **Gnaphalium japonicum** Thunb.; Hayata l.c. p. 39.

2. **Gnaphalium lineare** Hayata l.c. p. 39.

3. **Gnaphalium Morii** Hayata sp. nov. Annua; caulis erectus 40 cm. altus albo-lanatus toto foliatus. Folia linearia 4–5 cm. longa 3–4 mm. lata apice acuta basi attenuata sessilia integra supra glabra subtus dense albo-lanata. Capitula ad axillas foliorum superiorum dense aggregata; capitula ipsa minuta cylindrica 3 mm. longa 2 mm. lata, bracteis 1-seriatim dispositis linearibus glabris 3 mm. longis $\frac{1}{2}$–$\frac{1}{3}$ mm. latis hyalinis apice obtusis basi lana alba dense obtectis. Fl. ♀: marginales ∞-seriatim dispositi; corolla filiformis $2\frac{1}{2}$ mm. longa. Fl. ♀: centrales solitarii: corolla $2\frac{1}{2}$ mm. longa $\frac{1}{4}$ mm. lata tubulosa apice 5-lobata, lobis acutis. Achænium maturum obovoideum plus minus recurvum $\frac{2}{3}$ mm. longum pauce minute punctatum; pappi setæ albæ scabræ $2\frac{1}{2}$ mm. longæ.

Hab. Kappanzan, Tandaisha, Taroko, leg. U. Mori.

Resembles *G. indicum* in its inflorescence, but differs from it in the linear acute leaves.

4. **Gnaphalium indicum** Linn.; Hayata l.c. p. 39.

5. **Gnaphalium niitakayamense** Hayata l.c. p. 39.

6. **Gnaphalium hypoleucum** DC., Hayata l.c. p. 39.

7. **Gnaphalium formosanum** Hayata sp. nov. Annua. Caulis 60–70 cm. longus albo-lanatus toto foliatus. Folia linearia vel spathulata vel oblanceolata $4\frac{1}{2}$ cm. longa 9 mm. lata apice acuta vel obtusa ad summum breve apiculata basi attenuata integra utraque pagine dense vel sparse albo-lanata sessilia vel plus minus decurrentia. Capitula ad apicem ramorum dense cymosa. Involucrum semi-globosum 5 mm. longum totiusque latum, bracteis ∞-seriatim sitis exterioribus brevioribus, interioribus longioribus obovato-spathulatis $4\frac{1}{2}$ mm. longis 2 mm. latis apice rotundatis crenulatis dorso lanuginosis, intimis linearibus 4 mm. longis 1 mm. latis apice obtusis. Fl. ♀: marginales ∞; filiformes 3 mm. longi 10–20; corolla tubuliformis 3 mm. longa. Achænium maturum ignotum; pappi setæ copiosæ subalbæ plus minus coloratæ $2\frac{1}{2}$ mm. longæ.

Gnaphalium luteo-album Hayata (non Linn.) Gen. Ind. p. 39.

Hab. Shintengai.

Near *G. multiceps*, but differs from it in the structure of the pappus-hairs.

In our specimen, fl. ♀ and fl. ♀ are nearly the same in the shape of ovary; but, a very few fertile.

8. **Gnaphalium hololeucum** Hayata sp. nov. Caulis 20–30 cm. longus dense lanatus toto longitudine dense approximate foliatus. Folia oblanceolato-linearia 2½–3 cm. longa 3 mm. lata apice acuta basi attenuata integra utraque pagine dense albo-lanata. Capitula ad apicem caulis densissime cymosa. Involucrum semi-globosum 4 mm. longum 5–6 mm. in diametro, bracteis ∞-seriatim dispositis, exterioribus brevioribus ovatis interioribus obovato-spathulatis 3½ mm. longis apice obtusissimis, intimis linearibus 3½ mm. longis 1 mm. latis apice obtusissimis apice crenulatis flavissimis. Fl. ♀: marginales ∞-seriatim dispositi; corolla filiformis 2½ mm. longa. Fl. ♀: centrales ignoti. Achænium ignotum; pappi setæ 2 mm. longæ albæ subflavescentes.

Hab. Dorayen, leg. Y. Shimada, Dec. 1909.

Near *G. hypoleucum*, but differs from it in having leaves densely lanate on both sides.

Carpesium Linn.

Carpesium abrotanoides Linn.; Hayata l.c. p. 38.

Carpesium acutum Hayata l.c. p. 38.

Xanthium Linn.

Xanthium Strumarium Linn.; Hayata l.c. p. 41.

Siegesbeckia Linn.

Siegesbeckia orientalis Linn.; Hayata l.c. p. 41.

Eclipta Linn.

Eclipta alba Hassk.; Hayata l.c. p. 39.

Wedelia Jacq.

Key to species.

1. Leaves sessile .....1. *W. calendulacea.*
   Leaves stalked.....2.
2. Leaves small, crowded .....2. *W. prostrata.*

Leaves large on long stalks.....3. *W. biflora.*

1. **Wedelia calendulacea** Less.; Hayata l.c. p. 41.
2. **Wedelia prostrata** Hemsl.; Hayata l.c. p. 41.
3. **Wedelia biflora** Benth.; l.c. p. 41.

Helianthus Linn.

Helianthus annuus Linn.; Hayata l.c. p. 39.

Helianthus tuberosus Linn.; Hayata l.c. p. 39.

Glossogyne Cass.

Glossogyne tenuifolia Cass.; Hayata l.c. p. 39.

Bidens Linn.

Key to species.

1. Leaves pinnate or pinnatilobed .....2.
   Leaves simple not lobed .....1. *B. Shimadai.*
2. Leaves trifid .....2. *B. tripartita.*
   Leaves bipinnatifid or trifoliate .....3.
3. Leaves bi-pinnatifid.....3. *B. bipinnata.*
   Leaves 3-foliolate .....4. *B. pilosa.*

1. **Bidens Shimadai** Hayata sp. nov. (Fig. 28). Herba suffruticosa 60 cm. longa glabra ramosa, ramis oppositis. Folia opposita lanceolata apice acuminata basi acuta margine remote serrata vel moderate serrata 6–7 cm. longa $1\frac{1}{2}$–2 cm. lata membranacea utraque pagine glaberrima, petiolis 5 mm.—15 mm. longis basi dilatatis. Capitula ad apicem ramorum terminalia solitaria longe pedunculata, pedunculis 3 cm. longis; capitula campanulata 5 mm. longa, bracteis involucri 2-seriatim sitis, exterioribus foliiformibus spathulatis 1 cm. longis hirsutis capitula superantibus, interioribus scariosis oblongo-lanceolatis apice obtusis 5 mm. longis $1\frac{1}{2}$ mm. latis glabris. Flores omnes aequiformes; corolla flava, tubo $1\frac{1}{3}$ mm. longo, limbo 1 mm. longo apice 5-lobato, lobis triangularibus $\frac{1}{3}$ mm. longis; ovarium glabrum valde complanatum compresso-triangulare in sectione $1\frac{1}{2}$ mm. longum 1 mm. latum.

Fig. 28, *Bidens Shimadai* Hayata.

Achænium longe cuneiforme 7 mm. longum $1\frac{1}{2}$ mm. latum valde complanatum dorso medio 1-carinatum ad margines et carinas retrorse setulosum; pappi setæ 2 validissimæ $4\frac{1}{2}$ mm. longæ acutæ trigonæ ad angulos retrorse setulosæ.

HAB. Shichiseizan, leg. Y. SHIMADA, Sept. 1916.

Near *B. tripartita*, but differs from it in the simple, not lobed, leaves.

2. **Bidens tripartita** LINN.; HEMSL. Ind. Fl. Sin. I. p. 436.

HAB. Shichiseizan, leg. T. SŌMA, Mart. 1916.

New to the flora of Formosa.

3. **Bidens bipinnata** LINN.; HAYATA l.c. p. 37.

4. **Bidens pilosa** LINN.; HAYATA l.c. p. 37.

Synedrella GÆRTN.

Synedrella nodiflora GÆRTN.; HOFFMANN, in Nat. Pfl-fam. IV.—5, p. 212.

HAB. Akō; Nanki, leg. T. SOMA, Aug. 1915.

New to the flora of Formosa; perhaps introduced.

Tagetes LINN.

Tagetes patula LINN.; HAYATA l.c. p. 41.

Chrysanthemum LINN.

Key to species.

1. Leaves silky white or brown beneath .....1. *C. Morii.*
   Leaves not silky beneath .....2.
2. Leaves with petioles 7 cm. long .....2. *C. arisanensis.*
   Leaves with petioles 1–2 cm. long .....3. *C. indicum.*

1. **Chrysanthemum Morii** HAYATA sp. nov. Perennis 40–50 cm. longa. Caulis gracilis sericeo-hirsutus. Folia ad apicem caulis approximatim vel remote disposita in ambitu obovata pinnatifida vel lacerata vel pinnatiloba, lobis linearibus vel triangularibus acutis, supra subglabra subtus adpresse-sericeo-argenteo-tomentosa basi cuneata, petiolis 5 mm. longis vel nullis. Capitula solitaria terminalia semigloboso-campanulata cum floribus marginalibus 3 cm. in diametro, bracteis involucri 3–4 seriatim dispositis, exterioribus linearibus 6 mm. longis obtusis extus dense sericeo-tomentosis intus glabris, interioribus scariosis tenuibus linearibus hyalinis 1 cm. longis 2 mm. latis apice obtusis

extus medio sericeo-pubescentibus intus glabris. Fl. ♀: marginales liguliformes 1-seriatim siti, tubo 1 mm. longo, limbo liguliformi oblanceolato 1½ cm. longo 4 mm. lato apice obtuso 3–dentato extus glabro intus minutissime hirsuto. Fl. disci ☿: corolla tubuloso-campanulata 3 mm. longa apice 5-lobata, lobis triangularibus ⅓ mm. longis. Achænium maturum ignotum.

Hab. Taitō: Chakan, leg. U. Mori, Jan. 1908.

Near *Chrysanthemum sinense* Sabin. var. *japonicum* Maxim.; but differs from it in the much narrower leaves. Also near *Ch. morifolium* Ramat.; but differs from it in having more deeply lobate or laciniate leaves.

2. **Chrysanthemum arisanense** Hayata l.c. p. 38.

3. **Chrysanthemum indicum** Linn.; Hayata l.c. p. 38.

Cotula Linn.

Cotula anthemoides Linn.; Hayata l.c. p. 38.

Myriogyne Less.

(*Centipeda* Lour.)

Myriogyne minuta Less.; Hayata Gen. Ind. p. 40.

Artemisia Linn.

Key to species.

1. Heads heterogamous, disc-flowers sterile.....2.
   Heads heterogamous; all fertile .....4.
2. Heads very small 1½ mm. in diameter.....1. *A. capillaris.*
   Heads more than 2½–3 mm. in diameter .....3.
3. Heads nearly 4 mm. in diameter; leaves mostly clustered at the base of the stem .....2. *A. oligocarpa.*
   Heads nearly 3 mm. or 2½ mm. in diameter. Leaves scattered along the stem .....3. *A. morrisonensis.*
4. Leaves oblong not pinnatifid, whitish beneath .....4. *A. anomala.*
   Leaves pinnatifid .....5.
5. Leaves silky or cottony on the under side.....6.
   Leaves neither silky nor cottony on the under side, nearly glabrous.....8.
6. Stem all leafy .....5. *A. vulgaris.*

Stem leafy at the base only .....7.

7. Leaves more than 5–6 cm. long, segments 2 mm. broad... { 6. *A. Sōmai.* / 7. *A. batakensis.*

Leaves 2–3 cm. long, segments $1\frac{1}{2}$–2 mm. broad .....8. *A. Kawakamii.*

8. Pinnæ and pinnules linear very small .....9. *A. annua.*

Pinnæ and pinnules larger, oblanceolate .....9.

9. Heads nearly sessile.....10. *A. lactiflora.*

Heads long pedunculate .....11. *A. niitakayamensis.*

1. **Artemisia capillaris** Thunb.; Hayata l.c. p. 37

2. **Artemisia oligocarpa** Hayata l.c. p. 37.

3. **Artemisia morrisonensis** Hayata sp. nov. Suffrutescens 50–60 cm. alta simplex haud vel vix ramosa erecta recta glabra superne ad inflorescentiam abeuns. Folia pinnatisecta inferiora in ambitu rotundato-obtriangularia 3 cm. longa 4 cm. lata basi triangulari-cuneata ternatim bi-secta, segmentis lineari-filiformibus 1 mm. latis, glaberrima, petiolis 2 cm. longis basi dilatatis interdum basi plus minus fimbriatis; folia superiora ternatim secta minora, ad inflorescentiam minuta simplicia filiformi-linearia 7 mm. longa 1 mm. lata. Inflorescentia foliosa racemoso-paniculata 15–20 cm. longa 4–5 cm. lata. Capitula pedicellata, pedicellis 2 mm. longis hirsutis. Involucrum subglobosum, bracteis circ. 3–4-seriatim dispositis, extimis minutis ovatis 1 mm. longis, intimis obovato-oblongis $2\frac{1}{2}$ mm. longis 1 mm. latis scariosis. Receptaculum convexum haud hirsutum. Fl. ♀: marginales; ovarium $\frac{2}{3}$ mm. longum lineare; corolla ovoidea $\frac{2}{3}$ mm. longa apice 2–3-dentata; stylo 1 cm. longo, ramis stigmatis $\frac{2}{3}$ mm. longis tortuosis. Fl. ☿ centrales; corolla cylindrica apice 5-dentata 1 cm. longa; stigma apice penicillato-pectinatum truncatum.

Artemisia scoparia Hayata (non Waldst. et Kit.) Gen. Ind. p. 37.

Hab. Tozan, Morrison, Ganzan.

Differs from *A. scoparia* Waldst. et Kit. by the much narrower pinnæ of the leaves.

4. **Artemisia anomala** S. Moore in Journ. Bot. (1875), p. 227; Hemsl. Ind. Fl. Sin. I. p. 441. Herba suffruticosa simplex 60–80 cm. longa subglabra recta ad totam longitudinem foliata. Folia alterna oblongo-lanceolata 7 cm. longa $2\frac{1}{2}$ cm. lata apice acuta vel acuminata basi acuta margine serrulata

supra glabra subtus glaucissima molle hirsuta, petiolis 5 mm. longis. Capitula spicato-paniculata, paniculis axillaribus vel terminalibus, capitulis sessilibus. Involucrum oblongo-globosum 3 mm. longum $1\frac{1}{2}$ mm. latum, bracteis 3–4-seriatim dispositis, interioribus oblongis vel late spathulatis $2\frac{1}{2}$ mm. longis 1 mm. latis. Fl. ♀ : corolla filiformis $1\frac{1}{2}$ mm. longa granulis notata. Fl. ♀ : corolla tubulosa, limbo dilatato. Achænium ignotum.

Hab. Ritōzan, leg. T. Kawakami, Aug. 1913.

5. **Artemisia vulgaris** Linn. var **indica** Maxim.; Hayata l.c. p. 38.

6. **Artemisia** (§ *Abrotanum*) **Sōmai** Hayata sp. nov. (Pl. VIII.) Suffrutex cum inflorescentiis 20–50 cm. longus basi lignosus. Folia dense approximata pinnatifida in ambitu obovato-spathulata 7 cm. longa 3 cm. lata basi ad petiolum 1 cm. longum abeuntia, segmentis linearibus 1–2 cm. longis 2–3 mm. latis acutis, supra subglabra subtus dense argenteo-hirsuta. Racemi simplices vel paniculati 10–30 cm. longi efoliati vel foliis minoribus instructi, pedicellis 2 mm. longis. Capitulum 4 mm. longum subglobosum, involucri bracteis 3–4-seriatim dispositis, bracteis extimis oblongis 2 mm. longis 1 mm. latis, interioribus spathulatis 3 mm. longis apice obtusissimis denticulatis extus hirsutis intus glabris. Fl. ♀ : marginales tubuliformes; corolla apice 3-dentata. Fl. ♀ : corolla tubuloso-campanulata 2 mm. longa 1 mm. lata 5-lobata, lobis reflexis, deorsum granulis notata. Achænium ignotum.

Hab. Arisan : Tozan, leg. T. Sōma Dec. 1915.

7. **Artemisia batakensis** Hayata sp. nov. Perennis basi lignosa cum racemis 50–60 cm. longa apice ramosissima. Folia dense approximateque disposita bipinnatifida cum petiolis 8–10 cm. longa, pinnis linearibus 2–4 cm. longis 3 mm. latis, supra parce subtus dense albo-lanata. Capitula racemosa, racemis ramosissimis circ. 30 cm. longis, rhachibus lanatis, pedicellis 1–2 mm. longis lanatis. Involucrum urceolato-campanulatum 4–5 mm. longum, bracteis 3–4 seriatim sitis, extimis ovatis 2 mm. longis extus lanatis intus glabris, interioribus spathulatis $3\frac{1}{2}$ mm. longis apice rotundatis irregulariter denticulatis extus lanatis intus glabris. Receptaculum plus minus convexum glabrum. Fl. ♀ : marginales; corolla tubuliformis 2 mm. longa apice 3-dentata, stylo longe exserto 2-fido, ramis 1 mm. longis. Fl. ♀ : corolla tubuloso-campanulata $2\frac{1}{2}$ mm. longa apice 5-lobata, lobis exteriore recurvis, deorsum granulis notata.

Achænia obovoideo-cylindrica 1 mm. longa glabra apice longe barbata, barbis 2 mm. longis crispis, 4–5-costata.

Hab. inter Shinjō et Batakan, leg. B. Hayata et S. Sasaki, Aprili. 1917.

Near *A. Somai* Hayata, but differs from it by the long barbate achenes.

8. **Artemisia Kawakamii** Hayata sp. nov. (Pl. IX.) Suffrutex annuus cum racemis 7–8 cm. longus simplex. Folia dense approximatim disposita bipinnati-secta in ambitu oblonga obovata $2\frac{1}{2}$ cm. longa 1–2 cm. lata supra subglabra subtus dense argenteo-hirsuta, segmentis linearibus 1 mm. latis apice acutis. Racemi axillares simplices 7 cm. longi 2–3-capituliferi, pedicellis 2–3 mm. longis. Involucrum globoso-campanulatum 3 mm. in diametro extus parce lanatum, bracteis spathulatis 3 mm. longis 1 mm. latis apice obtusissimis; receptaculum convexum glabrum. Fl. ♀ : corolla tubulosa $1\frac{1}{2}$ mm. longa apice 3-lobata. Fl. ♀ : corolla tubuloso-campanulata 2 mm. longa 5-lobata, lobis recurvis. Achænia ignota.

Hab. Mt. Morrison, ad 8000 ped. alt., leg. T. Kawakami et S. Sasaki, Oct. 1909.

9. **Artemisia annua** Linn.; Hayata l.c. p. 37.

10. **Artemisia lactiflora** Wall. ex DC. Prodr. VI. p. 115; Maxim. in Mél Biol. VIII. p. 535; Hemsl. Ind. Fl. Sin. I. p. 444; Dunn et Tutcher Fl. Hongt. et Kwangt. p. 147. Herba suffruticosa 50–60 cm. longa tota longitudine foliata glabra. Folia pinnatifida vel pinnatisecta in ambitu obovata 6–7 cm. longa 3–4 cm. lata, segmentis interioribus minoribus, superioribus majoribus obovatis apice acutis serratis, utraque glabra. Capitula spicatim disposita, spicis terminalibus vel axillaribus simplicibus vel paniculatim dispositis, capitulis sessilibus. Involucrum subglobosum 2 mm. in diametro, bracteis 2–3-seriatim dispositis, interioribus oblongis $2\frac{1}{2}$ mm. longis 1 mm. latis utraque glabris. Fl. ♀ : corolla filiformis 1 mm. longa. Fl. ♀ : corolla tubuloso-campanulata $1\frac{1}{2}$ mm. longa $\frac{1}{2}$ mm. lata 5-lobata, lobis exteriore recurvis acutis; antheræ appendices cuspidato-acuminatæ. Achænium maturum ignotum.

Hab. Kelung, Y. Shimada, Dec. 1908.

An accurate description of the species is not accessible. In my species, the involucre is too small for *A. lactiflora*.

11. **Artemisia niitakayamensis** Hayata l.c. p. 37.

Crossostephium Linn.

Crossostephium artemisioides Less.; Hayata l.c. p. 38.

Gynura Cass.

Key to the species.

1. Leaves pinnatifid.....1. *G. pinnatifida.*
   Leaves entire, lobed or dentate, but not pinnatifid.....2.
2. Leaves subentire .....2. *G. elliptica.*
   Leaves serrate, dentate or lobed .....3.
3. Leaves obovate-lanceolate or lanceolate, irregularly dentate...3. *G. bicolor.*
   Leaves oblong or ovate.....4.
4. Flowers yellow .....4. *G. flava.*
   Flowers reddish yellow .....5. *G. ovalis.*

1. **Gynura pinnatifida** DC. Prodr. VI. p. 301; Franch. et Sav. Pl. Jap. I. p. 245; Hemsl. Ind. Fl. Sin. I. p. 448.

Hab. Tamsui et Tenmenzan, leg. T. Sōma, Nov. 1914.

New to the flora of Formosa.

2. **Gynura elliptica** Yabe et Hayata; Hayata l.c. p. 39.

3. **Gynura bicolor** DC.; Hayata l.c. p. 39.

4. **Gynura flava** Hayata l.c. p. 39.

5. **Gynura ovalis** DC.; Hayata l.c. p. 39.

Cacalia Linn.

Key to species.

1. Leaves palmately lobed .....1. *C. intermedia.*
   Leaves simple not lobed .....2. *C. monantha.*

1. **Cacalia intermedia** Hayata n. n. *Senecio intermedius* Hayata l.c. p. 40.

2. **Cacalia monantha** (Diels) n. n. *Senecio monanthus* Diels; Hayata l.c. p. 40.

Senecio Linn.

Key to species.

1. Scandent and trailing .....2.

Erect .....3.

2. Leaves triangularly lanceolate 9 cm. long serrulate .....1. *S. scandens.*

Leaves much smaller at most 4 cm. long, margin lobulate or grossly dentate.....2. *S. cratægifolia.*

3. Leaves nearly entire or obscurely serrulate .....4.

Leaves distinctly serrulate, dentate or laciniate .....5.

4. Plant from the first not cottony hairy, but nearly glabrous; radical leaves ovato-oblong attenuate to the base of the petioles; petioles 20–30 cm. long .....3. *S. taitoensis.*

Plant cottony white hairy at first, but nearly glabrous at length; radical leaves spathulate 5 cm. long.....4. *S. Tashiroi.*

5. Leaves laciniate .....5. *S. morrisonensis.*

Leaves not laciniate .....6.

6. Leaves sharply serrate or dentate .....6. *S. tozanensis.*

Leaves serrulate or denticulate.....7. *S. angustifolius=S. taiwanianus.*

1. **Senecio scandens** Buch.-Ham.; Hayata l.c. p. 40.

2. **Senecio cratægifolia** Hayata sp. nov. Scandentissima; caulis angulatus multo-striatus. Folia hastato-lanceolata vel triangulari-lanceolata 3–4 cm. longa $1\frac{1}{2}$ cm. lata apice acuminata basi lobulata obtusa margine remote mucronibus instructa chartacea utraque pagine glabra, petiolis 3–4 mm. longis. Capitula laxe pauceque cymosa. Involucrum late campanulatum bracteolis minutis linearibus 1–2 mm. longis 4–5 instructum, bracteis involucri 1-seriatim sitis linearibus 6 mm. longis 1 mm. latis apice acuminatis margine tenuibus glabris. Fl. marginales ♀: liguliformes 1-seriatim dispositi; ovarium hirsutum cylindricum; pappi setæ albæ scabræ 4 mm. longæ; corollæ tubus 3 mm. longus, limbo lineari-oblongo 5 mm. longo 2 mm. lato apice obtusissimo minute 3-denticulato 4-nervio glabro. Fl. ☿: centrales ∞; corolla tubuloso-campanulata 5 mm. longa glabra, tubo 3 mm. longo $\frac{1}{5}$ mm. lato, limbo cylindrico-campanulato 2 mm. longo $\frac{2}{3}$ mm. lato apice 5-lobato, lobis oblongo-triangularibus $\frac{2}{3}$ mm. longis $\frac{1}{3}$ mm. latis apice acutis. Achænium maturum ignotum.

Hab. Montibus centralibus, leg. U. Mori et S. Nakai, Dec. 1909 (typus!); Mt. Morrison, leg. U. Mori.

Differs from *S. scandens* by the hirsute achenes.

3. **Senecio taitoensis** Hayata l.c. p. 40.

4. **Senecio Tashiroi** Hayata sp. nov. Caulis scapiformis 30 cm. longus plus minus lanatus subsimplex. Folia radicalia oblongo-oblanceolata 5 cm. longa $1\frac{1}{2}$ cm. lata apice acuta vel obtusa basi attenuata margine irregulariter serrulata utraque pagine primum sparse lanata demum glabrata; folia caulina lanceolata vel linearia sessilia. Capitula ad apicem caulis pauce laxeque cymosa. Involucrum late obconicum 13 mm. latum 7 mm. longum, cum floribus marginalibus 3 cm. in diametro, bracteolis nullis; bracteis involucri circ. 1-seriatim dispositis linearibus 7 mm. longis extus plus minus hirsutis $\frac{2}{3}$ mm. latis. Flores ♀: marginales liguliformes; ovarium hirsutum cylindricum $1\frac{1}{2}$–2 mm. longum; pappi setæ albæ scabræ 3–4 mm. longæ; corollæ tubus 4 mm. longus $\frac{1}{4}$ mm. latus, limbo clavato-lineari 12 mm. longo 3 mm. lato apice truncato 3-lobulato, lobis triangularibus $\frac{1}{2}$–1 mm. longis, basi attenuato. Fl. ☿: ∞ centrales; corolla tubuloso-campanulata 7 mm. longa apice $1\frac{1}{2}$ mm. lata apice 5-lobata, lobis oblongo-triangularibus circ. 1 mm. longis apice acutis. Achænium maturum ignotum.

Hab. Montibus centralibus, leg. U. Mori, Aprili. 1910 (typus!)

Senecio campestris Hayata (non Linn.) Gen. Ind. p. 40.

Near *S. campestris*, but differs from it by the much longer styles.

5. **Senecio morrisonensis** Hayata l.c. p. 40.

6. **Senecio tozanensis** Hayata l.c. p. 40.

7. **Senecio angustifolius** Hayata l.c. p. 40.

Senecio taiwanianus Hayata l.c. p. 40.

Ligularia Cass.

Key to species.

1. Leaves palmately parted .....1. *L. japonica var. scaberrima.*
   Leaves reniformed .....2.
2. Leaves remotely serrulate or subentire.....2. *L. Tussilaginea.*
   Leaves shallowly 5-lobed or pentangular .....
   .....3. *L. Tussilaginea* var. *formosana.*

1. **Ligularia japonica** Less. var. **scaberrima** Hayata n. n.

Senecio japonicus Sch.-Bip. var. *scaberrima* Hayata l.c. p. 40.

2. **Ligularia Tussilaginea** (Burm.) Makino.

Senecio Kaempferi DC. Hayata l.c. p. 40.

3. **Ligularia Tussilaginea** (Burm.) Mak. var. **formosana** Hayata n.v. Folia reniformia angulata tenuiter 9–10-lobata, lobis late triangularibus, margine mucronibus remotissime instructa, cæterum ut typica.

Hab. Kaokaokei, Keibi, Shinkogai, Kelung.

Differs from the type by the lusterless angular leaves.

Echinops Linn.

Echinops dahuricus Linn.; Hayata l.c. p. 39.

Saussurea DC.

Key to species.

1. Leaves triangularly oblong, truncate or slightly sagittate at the base..... .....1. *S. formosana.*

Leaves pinnatifid .....2.

2. Leaves not cottony beneath.....2. *S. japonica* var. *longicephala.*

Leaves cottony beneath .....3. *L. affinis.*

1. **Saussurea formosana** Hayata sp. nov. Caulis erectus 60–100 cm. longus parce albo-lanatus demum glabratus multo-striatus. Folia inferiora oblongo-triangularia 20 cm. longa 14 cm. lata apice acuta basi late sagittata rarius ad petiolum decurrentia margine remote serrulata membranacea supra subglabra subtus tenuiter albo-lanata, petiolis 20 cm. longis. Capitula ad apicem ramorum terminalia vel axillaria vel racemosa longe pedunculata; capitula subglobosa 5–6 cm. in diametro. Involucrum late campanulatum 2 cm. longum, bracteis ∞-seriatim dispositis imbricatis exterioribus brevioribus linearibus, interioribus longioribus linearibus 1 cm. longis 2–3 mm. latis infra apicem contractis versus apicem aristato-serrulatis extus molle lanatis intus glabris, intimis longissimis 15 mm. longis 2 mm. latis apice acuminatis prope apicem serrulis unciformibus 2–3 instructis. Flores ∞ omnes tubuliformes. Achænium maturum clavato-cylindricum tetragonum 4 mm. longum $1\frac{1}{2}$ mm. latum apice truncatum basi obtusum glabrum nigrum ad angulos et faciem transverse pauce regulosum margine apicis denticulatum; pappi setæ 15–20 plumosæ 18 mm. longæ; corolla tubulosa 18 mm. longa, tubo 1 cm. longo $\frac{1}{4}$

mm. lato, limbo tubuliformi 6–7 mm. longo $1\frac{1}{2}$ mm. lato apice 5-lobato, lobis linearibus $2\frac{1}{2}$ mm. longis $\frac{1}{4}$ mm. latis.

Hab. Arisan: Karapin, leg. B. Hayata, Jan. 1912, (typus!); Taitō: Bunshiseki, Uchitaroko et Tanasai.

Near *Saussurea deltoidea*; but differs from it in the remotely serrulate or nearly entire leaves.

2. **Saussurea japonica** DC. var. **longicephala** Hayata l.c. p. 40.

3. **Saussurea affinis** Spreng; Hayata l.c. p. 40.

Cirsium Scop.

1. **Cirsium brevicaule** A. Gr.; Hayata l.c. p. 38.

2. **Cirsium chinense** Gard.; Hayata l.c. p. 38.

3. **Cirsium japonicum** DC.; Hayata l.c. p. 38.

4. **Cirsium Kawakamii** Hayata l.c. p. 38.

5. **Circium Morii** Hayata sp. nov. Herba 20–30 cm. alta; caulis subsimplex. Folia radicalia non visa, caulina linearia 15–20 cm. longa 2–3 cm. lata apice acuminata subsessilia margine laciniato-serrata, serris vel laciniis triangularibus apice setulis instructis, utraque pagine primum albo-tomentosa supra demum subglabrata. Capitula solitaria terminalia subglobosa 5–6 cm. in diametro, bracteis involucri 3–4-seriatim dispositis, exterioribus brevioribus linearibus 5 mm. longis apice setulosis, interioribus longioribus 3–4 cm. longis linearibus scariosis. Flores omnes ♀; corollæ tubo filiformi $1\frac{1}{2}$ cm. longo, limbo 14 mm. longo 2 mm. lato apice ad $\frac{1}{3}$ longitudinem lobato, lobis linearibus 5 mm. longis $\frac{1}{2}$ mm. latis; pappi setæ plumosæ. Achænium maturum ignotum.

Hab. Chakankei, leg. U. Mori, Jan. 1908.

Near *C. brevicaule*; but differs from it in having white thin cottony hairs all over the plant.

6. **Cirsium Wallichii** DC.; Hayata l.c. p. 38. Very likely identical with *C. Kawakamii* Hayata.

Ainsliæa DC.

Key to species.

1. Leaves palmately lobed.....1. *A. secundiflora.*

Leaves not lobed .....2.
2. Leaf-base cordate or truncate never decurrent to the petioles .....3.
Leaf-base decurrent to the petioles.....6.
3. Leaves quasiverticillate below the middle of the stem .....
..... 2. *A. macroclinidioides.*
Leaves usually basal or radical .....4.
4. Leaves 1–1½ cm. long .....3. *A. paucicapitata.*
Leaves 3–6 cm. long.....5.
5. Leaves deeply cordate .....4. *A. asarifolia.*
Leaves slightly cordate or truncate.....5. *A. Kawakamii.*
6. Achene perfectly glabrous .....*A. morrisonicola.*
Achene more or less hirsute.....6. *A. reflexa.*

1. **Ainsliæa secundiflora** Hayata (Pl. X.) l.c. p. 37.

2. **Ainsliæa macroclinidioides** Hayata l.c. p. 37.

3. **Ainsliæa paucicapitata** Hayata sp. nov. Folia omnia radicalia cordata 1½ cm. longa totiusque lata apice triangulari-acuta mucronata basi cordata margine remote mucronibus instructa supra tenuiter subtus dense fulvo-hirsuta, petiolis 1–1½ cm. longis tomentosis. Scapi aphylli 20 cm. longi ebracteati, capitulis spicatim sitis. Involucrum late obconicum circ. 10 mm. longum, bracteis multi-seriatim dispositis, interioribus lineari-lanceolatis 8 mm. longis 1½ mm. latis. Capitula 3–florata. Corollæ tubus 5 mm. longus, limbo 5–partito, partibus linearibus 5 mm. longis ⅓ mm. latis apice acutis. Achæniun dense hirsutum ; pappi setæ plumosæ.

Hab. Nōkōsan, ad 9000 ped. alt., leg. U. Mori, Jan. 1908.

Near *A. morrisonicola* Hay.; but differs from it by the much hairy leaves with cordate base.

4. **Ainsliæa asarifolia** Hayata sp. nov. (Pl. XI.) Perennis. Folia omnia radicalia vel ad supra basin caulis quasiverticillatim insita oblongo-cordata 7 cm. longa 4½ cm. lata apice obtusa ad centrum summorum brevissime mucronata basi cordata margine remotissime mucronibus instructa utraque pagine primum molle fulvo-tomentosa demum glabrata membranacea, petiolis 6–7 cm. longis fulvo-tomentosis, pilis mollis longis. Scapi 30 cm. longi efoliati bracteis minutis remote instructi subglabri. Capitula versus apicem scapi spicatim vel racemosim

subsecunde disposita. Involucrum conico-cylindricum circ. 1 cm. longum glabrum, bracteis 3–4-seriatim dispositis, bracteis interioribus oblanceolatis 7 mm. longis 2 mm. latis apice obtusis. Corolla circ. 1 cm. longa, tubo 5 mm. longo $\frac{1}{2}$ mm. lato, limbo 5-partito, segmentis linearibus 7 mm. longis $\frac{2}{3}$ mm. latis apice obtusis. Antheræ appendices lineares 1 mm. longae truncatæ vel obtusæ, caudis linearibus 1 mm. longis plus minus laceratis. Stylus 1 cm. longus basi conico-dilatatus apice 2-fidus, ramis $\frac{1}{2}$ mm. longis recurvis. Achænium maturum ignotum. Pappi setæ copiosæ plumosæ.

Hab. Kelung, leg. B. Hayata, Aprili. 1916.

5. **Ainsliæa Kawakamii** Hayata sp. nov. Folia fere omnia quasi-radicalia approximatim sita ovata vel cordato-ovata 6 cm. longa $3\frac{1}{2}$ cm. lata apice obtusa mucronata basi cordata margine utroque latere mucronibus remote instructa supra glabra subtus pallida hirsuta subtrinervia, petiolis 5–6 cm. longis molle tomentosis. Scapi aphylli 40–50 cm. longi, capitulis racemosim dispositis, pedicellis 5 mm. longis hirsutis. Involucrum conico-cylindricum 13 mm. longum 3 mm. latum, bracteis imbricatis, exterioribus brevioribus triangularibus interioribus longioribus linearibus. Corollæ tubus 5 mm. longus, limbo 5-partito, partibus linearibus 8 mm. longis 1 mm. latis apice acuto-obtusis. Achænium dense hirsutum; pappi setæ plumosæ.

Hab. Loco non indicato, leg. T. Kawakami.

Near *A. reflexa*, but differs from it by the cordate leaves with no decurrent base.

6. **Ainsliæa reflexa** Merrill; Hayata l.c. p. 37.

Gerbera Gron.

Gerbera integripetala Hayata l.c. p. 39.

Picris Linn.

Picris morrisonensis Hayata sp. nov. (Fig. 29). Perennis erecta 40 cm. longa pantente hirsuta sursum ramosa, pilis rectis apice furcatis, basi lignosa. Folia linearia 9 cm. longa 4–6 mm. lata apice acuminata basi attenuata margine remote serrulata et utraque pagine patenti-hirsuta subsessilia. Capitula ad apicem ramorum terminalia. Involucri bracteæ 2-seriatim dispositæ, exterioribus minoribus, interioribus longioribus linearibus 13 mm. longis 1 mm.

longis apice acuminatis dorso hirsutis. El. ignoti. Achænium maturum ferrugineo-fulvum fusiforme 4–5 mm. longum 1 mm. vel minus quam 1 mm. latum apice plus minus rostratum basi obtusum minute transverse elevato-striatum vel rugulosum ∞-costatum; pappi setae copiosæ 6 mm. longæ albæ plumosæ.

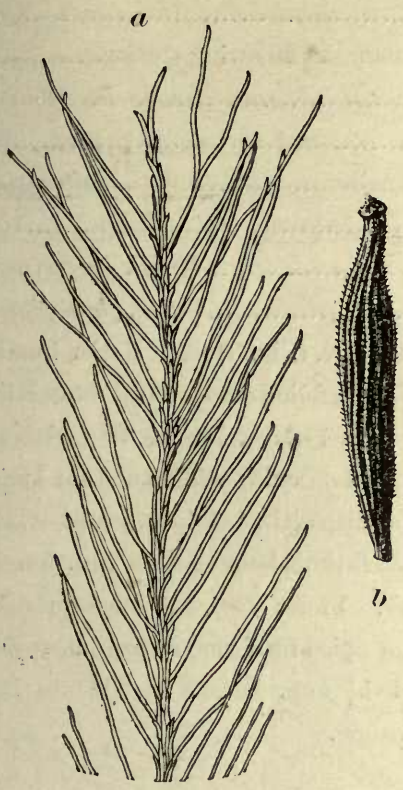


Fig. 29, *Picris angustifolia* HAYATA; *a*, a portion of a pappus-hair; *b*, an achene.

Picris hieracioides HAYATA Fl. Mont. Formos. p. 143 (non LINN.).

HAB. Monte Morrison, leg. U. MORI. Differs from *P. hieracioides* LINN. by the much narrower leaves.

Taraxacum HALL.

Taraxacum platycarpum H. DAHLST.; HAYATA l. c. p. 41.

Lactuca LINN.

Key to species.

1. Outer involucral bracts gradually passing to inner ones in length.....2.
   Outer involucral bracts minute, inner ones very long, no transitional ones between them.....6.
2. Creeping, stoloniferous .....1. *L. brachyrhyncha.*
   Erect, tall herbs.....3.
3. Perfectly glabrous. .....4.
   More or less hirsute. .....5.
4. Cauline leaves linear.....2. *L. brevirostris.*
   Cauline leaves pinnatifid. .....3. *L. mansuensis.*
5. Cusps at the apex of the leaves linear. .....4. *L. Morii.*
   Cusps at the apex of the leaves acuminately triangular ...5. *L. formosana.*
6. Flowers purple, stem 80–100 cm. tall.....6. *L. sororia.*

Flowers yellow, usually small herbs. .....7.
7. Pappus brownish. .....7. *L. Oldhami.*
Pappus white.....8.
8. Decumbent. Heads 1½ cm. long, larger than the following species.....
.....8. *L. debilis.*
Erect. Heads smaller.....9.
8. Small herb, nearly 15 cm. long, leaves smaller.....9. *L. taitoensis.*
Larger herb, more than 30 cm. tall.....10.
10. Leaves lacerate. .....10. *L. lacerrima.*
Leaves linear not lacerate. .....11. *L. flavissima.*

1. **Lactuca brachyrhyncha** Hayata sp. nov. (Fig. 31–8). Herba humilis repens stolonifera. Folia simplicia vel trifoliolata, foliolis obovatis vel rotundatis irregulariter crenatis basi subito cuneatis, petiolis 1–2 cm. longis, toto glaberrimis. Capitula solitaria terminalia. Involucrum obconico-campanulatum 1 cm. longum totiusque latum, bracteis 3-4-seriatim dispositis, extimis minutis ovatis 1 mm. longis, interioribus gradatim longioribus, intimis lanceolatis 8 mm. longis 2 mm. latis apice obtusis ad summum hirsutis. Flores flavi. Achænium maturum fusco-fulvum cylindricum basi obtusum apice fusiforme rostratum, rostro ½ mm. longo, cum rostro 7 mm. longum 1–1½ mm. latum prominente 10-costatum; pappi setæ albæ 4½ mm. longæ scabræ.

Hab. Kelung, Tamsui.

Lactuca repens Hayata (non Maxim.); Hayata Gen. Ind. p. 40.

Near *L. repens* Maxim.; but differs from it in having much shorter beaks of the achenes.

2. **Lactuca brevirostris** Champ.; Hayata l. c. p. 40.

3. **Lactuca mansuensis** Hayata sp. nov. (Fig. 31–6). Annua erecta recta simplex haud ramosa 50 cm. longa glaberrima toto foliata. Folia remote sita glaberrima pinnatilobata, in ambitu obovato-oblonga, lobis linearibus utroque latere 2–3, lobo terminali lineari 2–3 cm. longo 5 mm. lato apice acuto, petiolis 1–2 cm. longis vel nullis late alatis. Capitula laxe cymoso-racemosa. Involucrum late campanulatum 1 cm. longum 1½ cm. latum, bracteis involucri 2–3-seriatim dispositis, exterioribus minoribus, interioribus gradatim longioribus imbricatis linearibus 14 mm. longis 2 mm. latis apice obtusis. Flores ignoti.

Achænium nigrum valde complanatum oblongum rostris exceptis 4–4½ mm. longum 2½ mm. latum basi obtusum apice acutum ad rostram 1½ mm. longam abeuns facie transverse rugulosum; pappi setæ copiosæ albæ 8 mm. longæ scabræ.

Hab. Mansu (Kōshūn), leg. T. Sōma, Dec. 1913.

Near *Lactuca brevirostris*, but differs from it in having more elongate heads with narrower bracts.

4. **Lactuca Morii** Hayata sp. nov. (Fig. 30, 31–7). Herba erecta. Caulis 1–2 m. longus toto foliatus subglaber vel tenuiter hirsutus. Folia sessilia pinnatiloba in ambitu oblonga, lobis lateralibus utroque latere 2–3, irregulariter dentata vel lacerata, lobo terminali minuto lineari caudivel cuspidiformi 1½ cm. longo 1 mm. lato, supra scabra subtus pallidissima ad venas costasque setuloso-hirsuta. Capitula racemoso-cymosa laxe disposita. Involucrum late campanulatum 1½ cm. longum totiusque latum basi bracteolis minutis instructum, bracteis involucri exterioribus brevioribus ovatis 1 mm. longis, interioribus longioribus, intimis longissimis linearibus 1½ cm. longis 2 mm. latis glabris apice obtusis. Fl. ut videntur ochracei. Achænium maturum nigricans valde complanatum obovatum rostris exceptis 4 mm. longum 2½ mm. latum basi obtusissimum vel rotundatum apice longe rostratum, rostris 3 mm. longis, facie minute transverseque rugulosum; pappi setæ albæ scabræ 6 mm. longæ.

Fig. 30, *Lactuca Morii* Hayata.

Hab. Hakkudaisan, leg. U. Mori.

Near *L. brevirostris*; but differs from it in having long-cuspidate leaves.

5. **Lactuca formosana** Maxim.; Hayata l. c. p. 40.

6. **Lactuca sororia** Miq. (Fig. 31–5); Hayata l. c. p. 40.

Hab. Urai, Agioku, ad 1200 ped. alt., B. Hayata, Mai. 1916.

7. **Lactuca Oldhami** Maxim.; in Mél. Biol. IX. p. 363. *Lactuca Thunbergiana* Hayata (non Maxim.) l. c. p. 40.

Hab. Shinjō, Kushaku, Kelung, Taitō, Shinkiku.

As far as my observations extend, the species is quite distinct from *L. Thunbergiana* Maxim. to which it was reduced by W. B. Hemsley in his Ind. Fl. Sin. I. p. 484.

8. **Lactuca debilis** Benth. et Hook.; Hayata l. c. p. 40.

9. **Lactuca taitœnsis** Hayata sp. nov. (Fig. 31–2). Herba humilis 15–20 cm. longa ramosissima. Folia radicalia vel caulina linearia 5–6 cm. longa 5 mm. lata apice acuminata basi attenuata subsessilia subintegra membranacea. Capitula laxissime cymosa, cymis ramosissimis laxe patentibus. Involucrum campanulatum 5 mm. longum basi bracteolis minutis 5 instructum, bracteolis ovatis cuspidatis 1 mm. longis; bracteis involucri lanceolatis 5 mm. longis apice acutis $1\frac{1}{2}$ mm. latis glabris. Flores ignoti. Achænium longe rostratum cum rostris $4\frac{1}{2}$ mm. longum (rostris filiformibus 2 mm. longis) rostris exceptis fusiforme 2 mm. longum 10-costatum ad costas rugosum; pappi setæ albæ 3 mm. longæ copiosæ scabræ.

Hab. Taitō: Pinan, leg. K. Miyake. *Lactuca gracilis* Hayata (non DC.) in Gen. Ind. p. 40.

Near *L. versicolor*, but differs from it by the very much narrower leaves and yellow flowers.

10. **Lactuca lacerrima** Hayata sp. nov. (Fig. 31–1). Herba annua 30 cm. longa glaberrima. Folia radicalia lacerrima tenuissime membranacea in ambitu spathulata 10–12 cm. longa $1\frac{1}{2}$ cm. lata, laciniis patentissimis patentoserratis, basi ad petiolum longe attenuata; folia caulina minora minus lacerata. Capitula laxe cymoso-racemosa. Involucrum anguste campanulatum 5–6 mm. longum basi bracteolis minutis ovatis 1 mm. longis 5 instructum; bracteis involucri linearibus 6 mm. longis 1 mm. latis apice obtusis apice hirsutis. Flores ignoti. Achænium maturum longe rostratum cum rostris 1 mm. longis 4 mm. longum longe fusiforme basi obtusum 10 costatum ad costas minute hirsutum; pappi setæ albæ $3\frac{1}{2}$ mm. longæ scabræ.

Hab. Inter Busegan et Seisui, leg. B. Hayata, Mai. 1917.

Near *L. versicolor*, but differs from it in having lacerate leaves and in

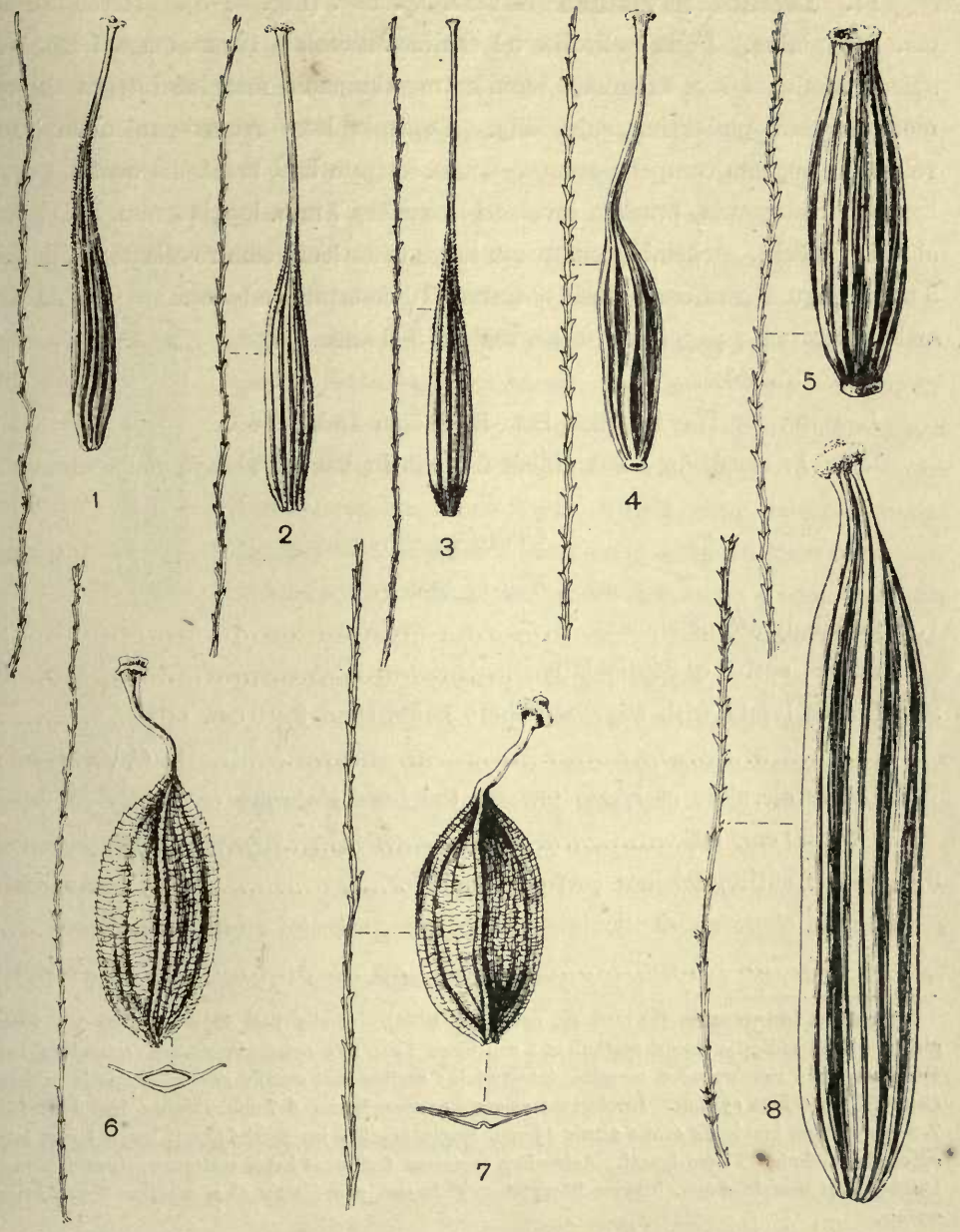


Fig. 31; 1, *Lactuca lacerrima* Hay.; 2, *L. taitoensis* Hay.; 3, *L. flavissima* Hay.; 4, *L. longirostra* Hay.; 5, *L. sororia* Miq.; 6, *L. mansuensis* Hay.; 7, *L. Morii* Hay.; 8, *L. brachyrhyncha* Hay.

having always yellow flowers.

11. **Lactuca flavissima** HAYATA sp. nov. (Fig. 31–3). Herba 20–50 cm. lata glabra. Folia radicalia vel caulina lanceolata 12 cm. longa 1 cm. lata apice acuminata basi attenuata tenuiter membranacea margine integra vel remote serrulata glaberrima subsessilia. Capitula laxe cymoso-paniculata. Involucrum anguste campanulatum 7–8 mm. longum basi bracteolis ovatis 1 mm. longis 5 instructum, bracteis involucri linearibus 7 mm. longis 2 mm. latis apice obtusis glabris. Achænium maturum longe rostratrum cum rostris 2 mm. longis 6 mm. longum fusiforme basi obtusum 10-costatum ad costam plus minus scabro-hirsutum; pappi setæ albæ scabræ 5–6 mm. longæ.

HAB. Taihoku.

L. versicolor HAYATA (non SCH.-BIP.) Gen Ind. p. 40.

Near *L. versicolor*; but differs from it in having always yellow-flowers.

Crepis LINN.

Key to species.

1. Leaves lyrate or sinuate .....2.
   Leaves entire or denticulate.....3.
2. Leaves lyrate with adpressed short hairs, stem 8–10 cm. tall .....
   ..... 1. *C. formosana.*
   Leaves serrulate or lyrate towards the base glabrous or nearly so, stem 20–50 cm. tall.....2. *C. japonica.*
3. Leaves entire, achenes perfectly smooth.....3. *C. koshunensis.*
   Leaves obscurely denticulate or subentire, achenes minutely muricate.....
   .....4. *C. integra.*

Lactuca longirostra HAYATA sp. nov. (Fig. 31–4). Herba basi lignosa 20–30 cm. longa glabra. Folia radicalia lineari-spathulata 8 cm. longa 1 cm. lata apice obtusissima rotundata basi longe attenuata membranacea margine integerrima; caulina basi sessilia subamplexicaulia minora. Capitula pauce laxe cymosa. Involucrum anguste campanulatum 6–7 mm. longum basi bracteolis 7–8 instructum, bracteolis ovatis acutis 1½ mm. longis, bracteis involucri 7½ mm. longis 2 mm. latis apice obtusissimis. Flores ignoti. Achænium maturum fusiforme longe rostratum, (rostris 2 mm. longis), cum rostris 4 mm. longum 10-costatum glabrum pappi setæ albæ copiosæ 3 mm. longæ scabræ.

HAB. Bonin: Chichijima, Komagari, leg. H. HATTORI.

Near *Lactuca lanceolata* (=*Crepis integra*) in the lanceolate leaves; but distinctly differs from it in the very long-beaked achenes.

1. **Crepis formosana** HAYATA l. c. p. 38.

2. **Crepis japonica** THUNB.; HAYATA l. c. p. 38.

3. **Crepis koshunensis** HAYATA sp. nov. (Fig. 32). Herba diffusa stolonifera. Caulis florifer interdum 30–40 cm. longus. Folia radicalia dense rotatim disposita spathulata 10–12 cm. longa 2–2½ cm. lata apice obtusissima nel rotundata basi longe attenuata margine integerrima crassiuscula utraque glaberrima; folia caulina minora elliptica 3½ cm. longa 1½ cm. lata remotissime disposita. Capitula laxe cymosa. Involucrum tubuloso-campanulatum 5–6 mm. longum, bracteis 2-seriatim dispositis, exterioribus minutis lanceolatis 1½ mm. longis, interioribus longissimis lanceolatis 5 mm. longis apice obtusis apice hirsutis utroque pagine glabris. Flores omnes liguliformes; corollæ tubus 2 mm. longus extus hirsutus, limbo liguliformi lanceolato 6 mm. longo apice truncato 5-dentato. Achænium complanatum subcylindricum 4 mm. longum ½ mm. latum 10-costatum glabrum apice basique truncatum; pappi setæ albæ 3½ mm. longæ scabræ.

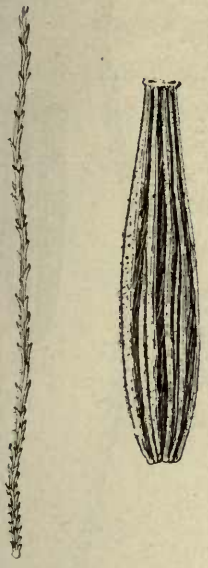


Fig. 32, *Crepis koshunensis* HAYATA.

HAB. Kōshūn; leg. K. MIYAKE, Juli. 1900.

Near *Crepis integra* MIQ.; but differs from it in the quite smooth (not muricate) achenes.

4. **Crepis integra** MIQ.; HAYATA l. c. p. 38.

Sonchus LINN.

Key to species.

1. Leaves lanceolate or linear-lanceolate. .....1. *S. arvensis.*
   Leaves lyrately pinnatifid .....2. *S. oleraceus.*

1. **Sonchus arvensis** LINN. HAYATA l. c. p. 41.

2. **Sonchus oleraceus** LINN. HAYATA l. c. p. 41.

Hieracium Linn.

Hieracium Morii Hayata sp. nov. (Fig. 33.) Perennis 20–30 cm. longa. Caulis erectus rectus subsimplex longe pauceque hirsutus. Folia radicalia longe spathulata 8 cm. longa 7 mm. lata apice obtusa basi longe attenuata margine mucronibus remote instructa, mucronibus uncinato-recurvis, utraque pagine et margine barbis longis sparse instructa. Capitula laxe pauceque racemosa vel ad apicem ramorum solitaria. Involucrum obconico-campanulatum 1 cm. longum, bracteis 2–3-seriatim dispositis, exterioribus extus dense hirsutis, pilis nigricantibus apice glanduloso-globuliferis, interioribus glabris linearibus 8 mm. longis. Flores ignoti. Achænium maturum glabrum cylindricum $\frac{2}{3}$ mm. latum 3 mm. longum leviter vel obscure costatum; pappi setæ 5 mm. longæ validiusculæ scabræ fulvescentes.

Hab. Montibus centralibus, leg. Mori et Nakai.

Near *Hieracium japonicum* Fr. et Sav., but differs from it in the much narrower and acuter leaves and in the brown achenes.

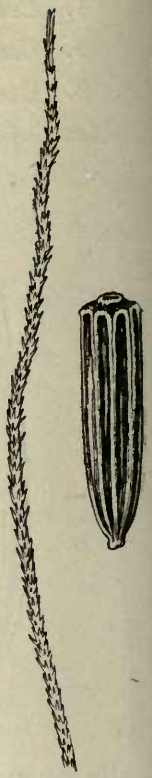


Fig. 33, *Hieracium Morii* Hayata.

Boragineæ.

Trigonotis.

Trigonotis elevato-venosa Hayata (Pl. III). Ic. Pl. Formos. VI. p. 32.

Hab. Sōseikyaku, Taiheizan.

Labiatæ.

Conspectus of genera.

After Briquet in Pflanzenfamilien IV. 3-a p. 207.

A. Style not gynobasic. Nutlets with lateral ventral hiluns which are generally large and often longer than half the length of ovaries.....*Ajuga.*

B. Style entirely gynobasic. Nutlets with basal hilums and generally smaller scars, or rarely ± basal-dorsal hilums and apophyses.

a. Seeds transversal; embryo with curved radicula lying on one of the cotyledons; calyx with scutellum. .....*Scutellaria.*

b. Seeds erect, embryo with straight short radicula.

α. Stamens ascending, patent or erect.

1. Anthers with parallel or divaricate long or ovate cells which are not or very slightly connate at the apex into one, but never turning flat after dispersing pollens.

△ Corolla deeply 2-lipped, with very different lobes; upper lips concave furnicate. Anthers ovate.

× Stamens 4, the posterior longer than the anterior.

Anthers with parallel or slightly divaricate cells. .....*Lophanthus.*

Anthers with divaricate cells.....*Glecoma.*

×× Stamens 4, the posterior shorter than the anterior.

□ Calyx 2-lipped, lower lip reclining against the upper lip and closing the throat; corolla with galeiformed upper lip. .....*Brunella.*

□□ Calyx tubiformed campanulate 5–10-toothed, more rarely 2-lipped. Upper lip of the corolla concave, often galeiformed rarely flat.

○ Upper lip of corolla concave or galeiformed, generally very much hairy.

* Style-branches very unequal, the posterior much shorter than anterior. .....*Leucas.*

** Style-branches nearly equal or equal.

† Nutlets ± sharply triangular with truncate apex.

Calyx-teeth not spiny. .....*Lamium.*

Calyx-teeth spiny. .....*Leonurus.*

†† Nutlets with rounded apex....*Stachys.*

○○ Upper lip of corolla mostly short and flat

glabrous.....*Anisomeles.*

△△ Corolla strongly or slightly 2-lipped, upper lip often concave. Anthers with linear narrow cells. Stamens 2. .....*Salvia.*

△△△ Corolla 2-lipped or nearly actinomorphic, with slightly different lobes. Upper lip, if exists, flat or very slightly concave. Anthers ovate.

□ Calyx 10–13-rarely 15-nerved. Corolla 2-lipped. Stamens ascending under the upper lip.

† Corolla exserted recurved ascendent. ...*Melissa.*

†† Corolla straight. .....*Calamintha.*

□□ Calyx 10–13-nerved. Corolla 2-lipped. Stamens patent from the base, straightly spreading, nearly equal. .....*Origanum.*

□□□ Calyx 10–13-nerved. Corolla nearly actinomorphic. Stamens spreading straight from the base and nearly equal.

† Fertile stamens 2, the anterior with divaricate cells. Nutlets with flat truncate top. ....*Lycopus.*

†† Stamens 4, with parallel cells. Nutlets with rounded top. .....*Mentha.*

□□□□ Calyx 10-nerved. Corolla differently 2-lipped or nearly actinomorphic. Stamens erect spreading, didynamous.

† Fertile stamens 4, erect, spreading, the anterior longer. Corolla short 5-fid. .....*Perilla.*

†† Fertile stamens 2, the posterior; the anterior reduced to staminodes. Corolla slightly 2-lipped; upper lip emarginate; lower lip 3-fid.... .....*Mosla.*

2. Anthers rounded, with cells which are connate into one cell

and becoming flat after dispersion of pollens.

° Anthers connate later. ..... *Elsholtzia.*

°° Anthers connate immediately, and at last flat.

† Calyx ovately tube-formed 5-toothed. Corolla 4-fid; the anterior lobes most prominent..... *Pogostemon.*

†† Calyx ovate-campanulate, 5-toothed. Corolla nearly equally 4-fid. ..... *Dysophylla.*

β. Stamens descending, lying on the lower lip or involved by the latter.

1. Lower lip short, strongly curved, sacciformed, contracted at the base..... *Hyptis.*

2. Lower lip longer, concave or boat shaped, contracted at the base, but not strongly curved.

Filaments all free..... *Plectranthus.*

Filaments connate at the base. ..... *Coleus.*

3. Lower lip hardly longer, but narrower, than the upper lip, flat or slightly concave.

Mature calyx with entire inwardly curved lower-lip.

Calyx in fruit tubiformed; verticillaster not capitate. ..... *Mesona.*

Verticillaster capitate..... *Acrocephalus.*

Mature calyx with 2-toothed lower-lip.

Verticillaster capitate. ..... *Acrocephalus.*

Verticillaster not capitate..... *Ocimum.*

Ajuga Linn.

Key to species.

1. Leaves nearly glabrous obovate or rhombic, obtusely dentate or lobulate. ..... 1. *A. dictyocarpa.*

Leaves hirsute obovate-spathulate. .....2.

2. Leaves repandous. .....2. *A. bracteosa.*

Leaves obtusely dentate. ..... *A. genevensis.*

1. **Ajuga dictyocarpa** Hayata sp. nov. Herba basi procumbens sursum ascendens, partibus ascendentibus 20–30 cm. longis, caulibus tenuiter hirsutis tetragonis. Folia membranacea caulina opposita obovata vel triangulari-obovata 3–4 cm. longa 2 cm. lata apice obtusissima vel rotundata basi obtriangulari-cuneata et subito attenuata ad petiolum abeuntia a medio deorsum integra medio sursum grosse obtusissime dentata vel lobulata supra subglabra subtus subglabra vel ad costas pubescentia ; folia superiora sessilia, inferiora petiolata, petiolis 1–1½ cm. longis. Verticillastri ad axillas foliorum superiorum siti 5–10-florati. Flores breve pedicellati, pedicellis 1–2 mm. longis vel nullis. Calyx campanulatus 3½ mm. longus 3 mm. latus hirsutus glanduloso-punctatus subequaliter 5-lobatus, lobis longe triangularibus 2 mm. longis 1 mm. latis ciliatis. Corolla erecta, tubo recto erecto cylindrico 6 mm. longo dorso hirsuto 1½ mm. lato intus basi hirsuto annulato ore haud dilatato, limbo 2-labiato, labro superiore fere obsoleto vel brevissimo truncato hirsuto 1½–2 mm. lato, labro inferiore maximo horizontaliter patenti subtus hirsuto supra glabro trilobato, lobo medio maximo 3 mm. longo totiusque lato apice cordato-emarginato basi angustiore 2 mm. lato, lobis lateralibus minoribus oblongo-triangularibus 1–2 mm. longis apice obtusis patentibus. Stamina 4, posteriora breviora, anteriora longiora erecta longe exserta recta, filamentis glabris. Stylo glabro erecto 8 mm. longo apice 2-fido, ramo anteriore breviore, posteriore longiore. Pseudo-achænium obovatum 2¼ mm. longum 1⅓ mm. latum plus minus complanatum distincte elevato-reticulatum, cicatricibus ventralibus oblongis 1⅔ mm. longis.

Hab. Taihoku: Dairyōtō, leg. T. Kawakami.

Somewhat near *Ajuga glabrescens* Mk.; but differs from it by the much less hirsute leaves and stems.

2. **Ajuga bracteosa** Wall.; Hayata l. c. p. 56.

3. **Ajuga genevensis** Linn.; Hayata l. c. p. 56.

Scutellaria Linn.

Key to species.

1. Leaves not punctate.....2.

Leaves punctate.....4.

2. Corolla swollen on the anterior side at the base.....3.

Corolla not swollen on the anterior side at the base.....1. *S. Tashiroi.*

3. Leaves smaller, thicker, petioles shorter. .....2. *S. luzonica.*

Leaves larger, thinner, petioles longer.....3. *S. indica.*

4. Leaves linear-ovate, smaller, truncate at the base.....4. *S. rivularis.*

Leaves ovate, larger, cuneate at the base.....5. *S. formosana.*

1. **Scutellaria Tashiroi** Hayata sp. nov. Suffruticosa 60–100 cm. alta; caulis tenuiter tomentellus vel hirsutus. Folia ovata vel triangulari-ovata 2½–3½ cm. longa 2–2½ cm. lata apice obtusissima basi tenuiter cordata margine crenata, crenis apice rotundatis plus minus ascendentibus, chartacea supra brevissime hirtella scabriuscula subtus brevissime villosa, petiolis 5–8 mm. longis hirsutis. Racemi axillares vel terminales 3–8 cm. longi, floribus oppositis, bracteis cuneato-rhomboideis 3 mm. longis 1½ mm. latis apice obtusis basi cuneatis extus glanduloso-hirsutis intus glabris, pedicellis 2 mm. longis hirsutis. Calyx extus glanduloso-hirsutus oblique campanulatus 3 mm. longus 2-labiatus flavo-punctatus intus glaber 2-labiatus, labro superiore latissimo brevissimo dorso scutello instructo, labro inferiore latissimo brevissimo. Corolla 2½ cm. longa basi extus hirsuta fauce dilatata 4 mm. lata, limbo 2-labiato, labro superiore 3-lobato, lobis lateralibus erectis oblique oblongis 4 mm. longis 3 mm. latis, lobo medio erecto cuculliformi apice emarginato, labro inferiore ovato 6 mm. longo 5 mm. lato apice rotundato. Stamina didynama, anterioribus brevioribus, sub labro superiore ascendentia, antheris glabris, loculis parallelis. Stylus glaber apice 2-fidus, ramo anteriore longiore. Discus basi gynophorii dispositus. Ovarium glabrum ½ mm. longum supra gynophorium insitum.

Hab. Loco non indicato, leg. Y. Tashiro.

2. **Scutellaria luzonica** Rolfe; Hayata l. c. p. 58.

3. **Scutellaria indica** Linn.; Hayata l. c. p. 58.

4. **Scutellaria rivularis** Wall.; Hayata l. c. p. 58.

5. **Scutellaria formosana** N. E. Brown in Gard. Chron. (1894) p. 212:—"The stems are square and glabrous, about three-quaters of a line thick, dull green, with reddish brown angles. Leaves 1¼ to 2 inches long, ovate, subobtuse, broadly cuneate at the base, obscurely 3 to 4-toothed on each margin,

glabrous and minutely punctate on both sides, bright shining green above, paler and often stained with purple beneath. Racemes terminal, 3–4 inches long, flowers opposite, the pairs $\frac{1}{3}$–$\frac{1}{2}$ inch distant. Bracts rhomboidal, 1 to $1\frac{1}{4}$ line long, $\frac{3}{4}$ line broad, like the pedicels and the calyx very minutely puberulous, green. Pedicels 2 lines long, green. Calyx $\frac{1}{8}$ inch long, green, the shield on its upper lip subquadrate with rounded angles, about $\frac{1}{8}$ inch long and broad. Corolla 1 to $\frac{1}{4}$ inch long, pubescent with gland-tipped hairs, the upper lip $\frac{1}{3}$ inch long, blue with a violaceous tinge, the lower lip transverse, broadly rounded, and slightly emarginate in front, $\frac{1}{3}$ inch broad, white, slightly tinted with blue; the tube is white, with a pale greenish tinge."

"*S. formosana* is closely allied to *S. javanica*, JUNGHUHN, but that is a taller plant, attaining a height of 3 feet."

The species above mentioned is recorded from Formosa; but we have never seen the plant in the island. It is somewhat near to *S. rubropunctata** in the punctate leaves, but differs from it in the much larger leaves and looser racemes.

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* **Scutellaria rubropunctata** HAYATA sp. nov. Herba basi leviter procumbens sursum erecta partibus erectis 20–40 cm. longis depresso-villosis rectis a basi usque ad apicem foliatis. Folia opposita membranacea triangularia vel triangulari-ovata 2½ cm. longa 1½–2 cm. lata apice obtusa basi late truncata vel acuta rarius leviter cordata margine praeter basin serrata, serris triangularibus ascendentibus supra brevissime parcissime hirsuta subtus tenuiter velutinosa subtus minutissime rubro-punctata, petiolis 1½–2½ cm. longis hirsutis. Racemi ad apicem caulis vel ramorum terminales 5 cm. longi subsessiles, floribus oppositis, bracteis minutis oblique spathulatis 2½ mm. longis 1½ mm. latis apice rotundatis basi cuneato-attenuatis utraque pagine glabris margine ciliolatis, pedicellis 1 mm. longis hirsutis. Calyx oblique campanulatus 1½ mm. longus 2 mm. latus extus hirsutus intus glaber æqualiter labiatus, labris brevissimis latissimis, labro posteriore dorso scutello instructo, scutello rotundato 1½ mm. longo. Corolla erecta 13 mm. longa, tubo 10 mm. longo basi anteriore gibboso, limbo 2-labiato, labro superiore 3-lobato, lobo medio cuculliformi, lobis lateralibus erectis oblique triangularibus 3 mm. latis 2 mm. longis apice obtusissimis, labro inferiore subrotundato 3 mm. longo. Stamina 4 didynama, anterioribus brevioribus, sub labro superiore ascendentia, antheris glabris cordatis, loculis subparallelis margine ciliolatis. Stylus apice 2-fidus, ramo posteriore obsoleto. Ovarium glabrum 4-partitum, partibus obovoideis, gynophoris ¼ mm. longis; discus infra gynophorium situs ¼ mm altus anteriore in glandam tumens.

HAB. Loo-choo: Okinawa, leg. Y. TASHIRO, No. 8 et 7.

Near *S. formosana* N. E. BROWN, but different from it by the much smaller leaves and denser racemes.

Lophanthus Benth.

Lophanthus formosanus Hayata sp. nov.=*Lophanthus rugosus* Hayata Gen. Ind. p. 56. (non Fisch. et Mey.) Herba basi suffruticosa circ. 60 cm. longa erecta recta tetragona 3–4 mm. lata glabra. Folia opposita tenuiter membranacea ovato-triangularia 7–9 cm. longa 4–4½ cm. lata apice acuminata basi late truncata vel leviter cordata margine præter basin acumenque crenato-dentata, dentibus obtusissimis vel semi-rotundatis ascendentibus, supra glabra subtus tenuiter hirsuta impresso-punctata, subtus pallidiora, petiolis 2–3 cm. longis. Racemi terminales cylindrici, verticillastris a se 1–2 cm. remotis sursum plus approximatis, pedunculis racemorum 3–4 cm. longis, verticillastris sessilibus vel pedunculatis 5–10-floratis, pedicellis ½–1 mm. longis glabris. Calyx tubuloso-campanulatus tenuiter hirsutus vel glaber 7 mm. longus 3 mm. latus 15-nervatus apice 5-lobatus, lobis oblongo-triangularibus 3 mm. longis 1½ mm. latis apice acuminatis secus marginem et medium costatis basi haud contractis intus glabris. Corolla tubulosa sursum 7 mm. longa 2–3 mm. lata apice breviter extus brevissime hirsuta 2-labiata, labro superiore late rotundato 2 mm. lato 1 mm. longo apice 2-lobato, lobis ½ mm. longis, labro inferiore latissimo 3-lobato, lobo medio latissime rotundato 3 mm. lato 1½ mm. longo apice rotundato vel tenuiter emarginato basi contracto, lobis lateralibus minutis late rotundatis ½ mm. longis. Stamina 4 didynama, anterioribus longioribus, erecta supra labrum superius exserta, antheris glabris oblongis, loculis parallelis, filamentis glabris, stylo validiusculo apice breviter 2-fido, ramis subæquilongis. Ovarium 4-partitum, partibus obovoideis apice hirsutis vel pilis fasciculatis instructis. Discus sub ovario annularis ½ mm. altus anteriore elevatus.

Hab. Suisha, Shūshūgai, leg. C. Owatari, Jan. 1898.

Differs from *L. rugosus*, by the much longer calyx and corolla. According to Briquet (in Pflanzenfamilien IV-3 a, p. 233), *Agastache* is separated from *Lophanthus* by the position of stamens. In the former, the posterior stamens are descending, while the anterior ones are ascending; in the latter genus, the posterior stamens are ascending, while the anterior ones more or less straight-patent. In my opinion, however, these differences in the position of stamens are not to be regarded as a sufficient character by which the two genera may

be separated. *Agastache* should, therefore, be included in *Lophanthus*, unless any other character is found to justify the separation of the two genera.

Glecoma Linn. (=*Glechoma* Linn.)

Glecoma hederacea Linn.; Hayata l. c. p. 57.

Note: The generic name *Glecoma* is older than *Glechoma*.

Brunella Linn. (=*Prunella* Linn.)

Brunella vulgaris Linn.; Hayata l. c. p. 57.

Note: The generic name *Brunella* is older than *Prunella*.

Leucas Benth.

Key to species.

Leaves smaller, bracts lanceolate very small. .....1. *L. takaœnsis.*

Leaves larger, bracts linear longer. .....2. *L. mollissima.*

1. **Leucas takaœnsis** Hayata sp. nov. Perennis suffruticosa, caulis basi procumbens sursum erectus minute depresso-hirsutus tetragonus. Folia opposita ovata triangulari-ovata 1½–1 cm. longa 8–13 mm. lata apice obtusissima vel rotundata basi truncata vel cuneata margine crenis 1–2 utroque latere instructa, crenis semi-rotundatis, supra sparse subtus dense depresso-velutinosa chartacea, petiolis 5–8 mm. longis. Flores ad axillas 5–10 congesti, pedicellis 1–2 mm. longis hirsutis, pilis ascendenti-recurvis. Calyx tubuloso-campanulatus 6 mm. longus 3–4 mm. latus extus hirsutus 10–12 costatus intus tenuiter hirsutus apice 5-dentatus, dentibus acuminato-triangularibus 1½–2 mm. longis 1 mm. latis acuminatis medio costatis margine ciliolatis, inter dentes setula vel denticulo instructus, denticulis ½ mm. longis. Corolla longe exserta 12 mm. longa, tubo 7–8 mm. longo 1 mm. lato extus glabro intus medio hirsuto-annulato, limbo 2-labiato, labro superiore galeiformi oblongo 4 mm. longo 2½ mm. lato apice rotundato extuse dense hirsuto ad marginem densissime fasciculato-piloso, pilis rectis validiusculis albis 1 mm. longis, intus subglabro, labro inferiore in ambitu obtriangulari 4 mm. longo 5 mm. lato utraque facie glabro, lobo medio obcordato 3 mm. longo 4 mm. lato apice emarginato basi cuneato-

angustato margine subintegro, utraque pagine glabro, lobis lateralibus semi-oblongis 3 mm. longis apice rotundatis. Stamina 4 didynama, anterioribus longioribus, fauce tubi corollæ oriunda, filamentis glabris sub galea ascendentibus erectis, antheris glabris, loculis divaricatis confluentibus. Stylo glabro apice 2-fido, ramo anteriore longiore 2mm. longo deorsum leviter recurvo, ramo posteriore 1 mm. longe. Ovarium 4-partitum glabrum apice truncatum. Discus infra ovarium situs $\frac{1}{2}$ mm. altus anteriore glandula brevissima instructus.

Leucas lanata HAYATA Gen. Ind. p. 57, (non BENTH.).

HAB. Takao, Shōryūkiūtō.

Near *L. lanata* BENTH.; but distinguishable from it by the very small lanceolate bracts and in the much smaller leaves.

2. **Leucas mollissima** WALL.; HAYATA Gen. Ind. p. 57.

L. javanica HAYATA Gen. Ind. p. 57, (non BENTH.).

Lamium LINN.

Key to species.

1. Anthers tufty hairy. .....1. *L. amplexicaule.*
   Anthers slightly hairy or entirely glabrous. .....2.
2. Anthers slightly hairy. .....3.
   Anthers glabrous. .....4.
3. Calyx thinly hirsute. .....2. *L. uraiense.*
   Calyx densely hirsute. .....3. *L. formosanum.*
4. Leaves rhombic or triangularly ovate 2-3 cm. long. ....4. *L. kelungense.*
   Leaves oblong oblong-lanceolate nearly 20 cm. long. .....5.
5. Leaves nearly entire. .....5. *L. longepetiolata.*
   Leaves dentate. .....6. *L. gesneroides.*

Lamium chinense BENTH. var. *parviflora* HEMSL.; HAYATA l. c. p. 57.

NOTE: The variety may be a form of *Lamium kelungense* HAYATA newly described in the present volume.

1. **Lamium amplexicaule** LINN.; HAYATA l. c. p. 57.

2. **Lamium uraiense** HAYATA sp. nov. Herba annua ? basi fruticosa,

caulis 30–40 cm. longus erectus rectus hirsutus. Folia opposita membranacea oblonga vel ovato-oblonga 9 cm. longa $3\frac{1}{2}$ cm. lata apice acuminata basi subito cuneata ad petiolum attenuata margine præter basin et acumen serrata, basi et acumine integro, supra tenuissime hirsuta vel subglabra subtus subglabra, subtus pallidiora, petiolis circ. 1 cm. longis. Flores ad axillas foliorum oppositorum glomerati, pedicellis 2–3 mm. longis, bracteis minutis vel obsoletis. Calyx oblique campanulatus plus minus declinatus 8 mm. longus 5 mm. latus extus breve hirsutus intus glaber 5-dentatus, dentibus triangularibus cuspidiformibus, cuspidibus 2 mm. longis. Corolla oblique campanulata 1 cm. longa $\frac{1}{2}$ cm. lata extus hirsuta intus glabra basi hirsuto-annulata, tubo 5 mm. longo versus apicem dilatato, fauce ampliato, labro superiore oblongo 5 mm. longo 4 mm. lato extus hirsuto intus glabro, apice alte 2-lobato, lobis oblongis $2\frac{1}{2}$ mm. longis totiusque latis apice rotundatis, labro inferiore patenti 3-lobato, lobo medio oblongo-rotundato valde concavo 3 mm. longo $2\frac{1}{2}$ mm. lato, lobis lateralibus brevioribus oblique rotundatis. Stamina 4 didynama apice tubi affixa, posteriora breviora, anteriora longiora, filamentis complanatis hirsutis, antheris rotundato-cordatis plus quam 1 mm. longis et latis pilis 2–5 instructis, loculis subparallelis. Stylus 8 mm. longus glaber apice 2-fidus, ramo inferiore $\frac{1}{2}$ mm. longo, longiore quam ramo superiore. Ovarium glabrum truncatum 4-partitum, partibus lævibus apice truncatis. Discus infra ovarium situs integer, glandis haud instructis.

Hab. Uraisha, leg. H. Inaba, Juli. 1911.

3. **Lamium formosanum** Nakai; Hayata Gen. Ind. p. 98. *Ajuga formosana* Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 318.

Hab. Kappanzan, Funsui, Biōritsu—Taiko.

Floral structure of this species is nearly the same as that of *Matsumurella* and *Ajugoides* (Makino in Tōkyō Bot. Mag. XXIX. pp. 279–283) which nearly quite agree with *Lamium*.

Stenokalamos Hayata subgen. nov.

Corollæ tubus exsertus angustatus basi leviter arcuatus vel rectus fauce minus ampliatus intus piloso-annulatus; limbus 2-labiatus, labro postico erecto concavo, antico patenti haud appendiculato; anthera haud hirsuta.

Resembles *Orvala* and *Galeobdolon* in the glabrous anthers, but distin-

guishable from them in the not much ampliate throat of the corolla-tubes. The new subgenus is much nearer to *Galeobdolon* than to *Orvala*, and perhaps should be united to the former, when the floral structures are more fully known. *Matsumurella* and *Ajugoides* recently established by Mr. T. MAKINO are perhaps to be referable to the new subgenus or to *Galeobdolon*.

4. **Lamium** (§ *Stenokalamos*) **kelungense** HAYATA sp. nov. (Pl. XII.) Annua basi procumbens sursum erecta, partibus caulis erectis 5–10 cm. longis toto tenuiter villosis. Folia opposita membranacea triangulari-rotundata vel oblonga $3\frac{1}{2}$–3 cm. longa 3–$2\frac{1}{2}$ cm. lata apice obtusa basi late truncata vel late cuneata margine crenato-serrata, serris obtusissimis, supra tenuiter hirsuta subtus villosa, petiolis 1–3 cm. longis hirsutis. Flores ad axillas foliorum 4–5-glomerati subsessiles, bracteis oblanceolatis 6–7 mm. longis hirsutis. Calyx hirsutus campanulatus 7 mm. longus 7 mm. latus extus dense hirsutus intus laxe hirsutus vel subglaber 5-lobatus, lobis subæqualibus lanceolato-triangularibus $3\frac{1}{2}$ mm. longis 2 mm. latis apice acuminatis breve aristatis ad marginem et ad medium nervatis margine ciliatis. Corolla albo-rosea $1\frac{1}{2}$–2 cm. longa basi glabra sursum extus hirsuta, tubo 5–6 mm. longo 1–2 mm. lato sursum leviter dilatato, limbo 2-labiato, labro superiore erecto 10 mm. longo obovato-oblongo 1 cm. longo 6 mm. lato apice tenuiter emarginato basi leviter contracto margine ciliato extus longe hirsuto intus subglabro, labro inferiore horizontaliter patenti obovato-oblongo 1 cm. longo 8 mm. lato 3-lobato, lobo medio late rotundato 5 mm. longo 1 cm. lato extus subglabro intus glabro apice truncato vel leviter emarginato margine undulato, lobis lateralibus obliquis semi-oblongis interiore falcatis apice rotundatis, tubo intus glabro supra basi annulariter hirsuto. Stamina 4 didynama, anteriora longiora, erecta recta apice recurva sub lobo posteriore ascendentia, filamentis glabris complanatis, antheris glabris, loculis divaricatis oblongis, stylo glabro erecto apice deorsum recurvo 2–fido, ramis subæqualibus. Ovarium glabrum 4-partitum, partibus apice truncatis.

Descriptio aucta: Flores albi vel plus minus roseastri; labium intus purpureo-maculatum, maculis linearibus; antheræ fusco-atro-purpureæ latere exteriore glandulis albis globosis sessilibus basi circ. 10 conspersæ. Pollinia alba.

HAB. Kelung: Senton, leg. B. HAYATA, Mai. 1916.

Very near *Matsumurella stolonifera* MAKINO; but differs from it by the

much more hirsute leaves.

5. **Lamium** (*Stenokalamos*) **longepetiolata** HAYATA sp. nov. Herba erecta 60–70 cm. longa, caulis subglaber tetragonus 6 mm. latus. Folia opposita longe petiolata membranacea oblonga vel oblongo-lanceolata 23 cm. longa 8 cm. lata apice acuminata basi obtusa vel obtusissima margine subintegra erosa mucronibus minutis remote instructa utraque glabra subtus pallidiora, venis lateralibus primariis utroque latere costæ 5–6 angulo 30° a costa egressis, petiolis 7 cm. longis. Verticillastri axillares sessiles 10–20 florati multi-bracteati, bracteis spathulatis lincaribus 10–15 mm. longis 2–3 mm. latis apice cuspidatis hirsutis. Calyx extus dense hirsutus tubuloso-campanulatus 13 mm. longus sursum 8 mm. latus ad os 5-lobatus, lobis triangularibus apice aristato-acuminatis cum acumine 4 mm. longis 2–3 mm. latis subæqualibus, intus sursum tenuiter hirsutus deorsum glaber. Corolla tubulosa apice dilatata 2 cm. longa extus basi deorsum glabra sursum densissime hirsuta intus glaberrima ad medium tubi hirsuto-annulata, tubo 12 mm. longo 2–3 mm. lato, limbo subito ampliato 2 labiato, labro superiore erecto oblongo 6 mm. longo 4 mm. lato apice brevissime 2-lobato vel emarginato basi haud contracto intus glabro extus dense hirsuto, labro inferiore late rotundato 8 mm. longo 10 mm. lato 3-lobato, lobo medio late rotundato 4 mm. longo 6 mm. lato margine denticulato, lobis lateralibus oblongis latere interiore 3 mm. longo latere exteriore 8 mm. longo margine integris. Stamina 4 didynama, anterioribus longioribus, filamentis hirsutis complanatis e fauce corollæ oriundis sub labro posteriore ascendentibus erectis, antheris glabris, loculis divaricatis late rotundatis basi glanduloso-verrucosis. Stylo glabro apice 2-fido, ramis æqualibus $\frac{1}{2}$ mm. longis. Ovarium glabrum apice truncatum.

HAB. Kōshūn: Kuraru, leg. H. INABA.

6. **Lamium** (*Stenokalamos*) **gesneroides** HAYATA sp. nov. Herba annua ? stolonifera; caulis 30–40 cm. longus erectus rectus subglaber a basi usque ad medium efoliatus sursum foliatus. Folia oblonga 18 cm. longa 8 cm. lata apice acuta vel acuminata basi acuta membranacea margine dentato-serrata, serris triangularibus ascendentibus apice mucronibus instructis, supra tenuissime sparsissimeque hirsuta subtus glabra, venis lateralibus primariis utroque latere costæ 7–8 angulo acuto a costa egressis, petiolis 2 cm. longis. Verticillastri 10–13-

florati sessiles axillares multi-bracteati, bracteis lincaribus vel spathulatis 1 cm. longis latis hirsutis apice acuminato-aristatis. Calyx sessilis tubuloso-campanulatus extus dense hirsutus intus glaber 8 mm. longus 5-costatus apice 5-dentatus, dentibus triangularibus 2 mm. latis apice arista instructis cum arista 2 mm. longis. Corolla tubuloso-campanulata basi extus glabra sursum extus densissime hirsuta intus toto glabra, sed ad medium tubi hirsuto-annulata, tubo 1 cm. longo 2 mm. lato, limbo 2-labiato, labro superiore erecto obovato-oblongo 8 mm. longo 5 mm. lato apice emarginato basi haud vel tenuiter contracto, labro inferiore horizontaliter patenti late rotundato 8 mm. longo totiusque lato 3-lobato, lobo medio rotundato-triangulari 5 mm. lato 5 mm. longo apice triangulari-acuto margine subintegro, lobis lateralibus oblongis. Stamina didynama, anterioribus longioribus, filamentis complanatis hirsutis, antheris late reniformibus, loculis glabris lævibus divaricatis plus minus confluentibus. Ovarium glabrum apice truncatum, stylo glabro apice 2-fido, ramis $\frac{1}{2}$ mm. longis, anteriore longiore.

Hab. Loco non indicato, leg. T. Sōma.

Near *L. longepetiolata* Hay.; but differs from it in the dentate leaves, in the acute middle lobe of the lower lip, and in the not verrucous anthers.

Leonurus Linn.

Leonurus sibiricus Linn.; Hayata Gen. Ind. p. 57.

Stachys Linn.

Key to species.

1. Leaves smaller, at most 3 cm. in length.....1. *S. leptopoda.*
   Leaves larger, at least 6 cm. in length.....2.
2. Leaves petiolate.....2. *S. oblongifolia.*
   Leaves nearly sessile.....3. *S. subargentea.*

1. **Stachys leptopoda** Hayata sp. nov. Herba annua pauce ramosa vel simplex circ. 30 cm. longa; caulis tetragonus tenuiter villosus a basi sursum foliatus. Folia membranacea lineari-lanceolata 3 cm. longa 7 mm. lata apice obtusa basi truncata utraque pagine tenuiter villosa margine crenulato-serrata,

petiolis foliorum inferiorum longioribus 1 cm. longis superiorum brevioribus interdum ad nullum reductis villosis. Spicæ verticillastrorum terminales simplices, bracteis inferioribus cum foliis conformibus superioribus minoribus ad nullum reductis, verticillastris inferioribus a se 3 cm. remotis, superioribus plus approximatis. Calyx campanulatus 6–7 mm. longus 4–5 mm. latus extus patento-hirsutus intus sursum hirsutus basi glaber apice 5-lobatus, lobis triangularibus $2\frac{1}{2}$ mm. longis apice acuminatis medio costatis, costis apice ad aristam productis secus margines nervatis. Corollæ tubus 6 mm. longus fauce 2 mm. latus extus subglaber intus medio sursum hirtellus, limbo 2-labiato, labro superiore obovato $3\frac{1}{2}$ mm. longo 3 mm. lato apice subtruncato extus hirsuto intus glabro, labro inferiore oblongo 7 mm. longo 4 mm. lato tenuiter 3-lobato, lobo medio rotundato 3 mm. longo totiusque lato apice rotundato basi contracto, extus hirsuto intus glabro, lobis lateralibus subtriangularibus obtusis latis. Stamina 4 subæquilonga sub labro superiore ascendentia, antheris glabris, loculis valde divaricatis subconfluentibus, filamentis hirsutis. Stylus glaber apice breve 2-fidus, ramis æquilongis $\frac{1}{4}$ mm. longis. Ovarium glabrum, partibus ovoideis. Discus haud in glandam tumens.

Hab. Akō: leg. T. Kawakami, Aprili. 1905.

Near *Stachys oblongifolia* Benth.; but distinguishable from it by the much smaller and slenderer form with much smaller leaves and flowers.

2. **Stachys oblongifolia** Benth.; Hayata l. c. p. 58.

3. **Stachys subargentea** Hayata sp. nov. Herba annua 40–50 cm. longa erecta basi pauce ramosa; caulis tetragonus tenuiter villosus, pilis descendentibus. Folia opposita subsessilia vel breve petiolata lineari-lanceolata 7 cm. longa $1\frac{1}{2}$ cm. lata apice obtusa vel obtusissima margine crenato-serrata basi truncata supra tenuiter molleque villosa subtus dense molleque villosa albicantia, petiolis brevissimis 1–3 mm. longis; foliis superioribus sessilibus. Verticillastri spicatim superpositimque dispositi, spicis terminalibus simplicibus 10–12 cm. longis, bracteis inferioribus cum foliis conformibus sessilibus, superioribus gradatim minoribus ad 2 mm. in longitudine reductis, verticillastris inferioribus a se 2–3 cm. remotis superioribus gradatim approximatis. Calyx campanulatus extus intusque dense villosus 7 mm. longus totiusque latus 5-lobatus, lobis triangularibus 2 mm. longis et latis apice acuminatis ad aristam productis medio

costatis. Corollæ tubus 6 mm. longus fauce 3 mm. latus medio intus hirsuto-annulatus extus subglaber, limbo 2-labiato extus hirsuto intus glabro, labro superiore obovato 4 mm. longo $2\frac{1}{2}$ mm. lato apice rotundato basi haud vel vix contracto margine ciliolato, labro inferiore obovato 8 mm. longo ascendenti-patenti 3-lobato, lobo medio subcordato 4 mm. longo apice rotundato basi contracto margine haud ciliolato, lobis lateralibus oblongis 2 mm. latis obtusis. Stamina 4 æquilonga, filamentis hirsutis, loculis valde divaricatis subconfluentibus. Stylus glaber apice 2-fidus, ramis æquilongis $\frac{1}{4}$ mm. longis. Ovarium glabrum, partibus ovoideis. Discus haud vel vix in glandam tumens.

Hab. Biōritsu, leg. Y. Shimada, Mart. 1909.

Near *Stachys oblongifolia* Benth.; but differs from it by the nearly sessile leaves. This is perhaps the same species which was formerly recorded as *Stachys oblongifolia* Benth. from the island.

Anisomeles R. Br.

Anisomeles ovata R. Br., Hayata Gen. Ind. p. 56.

Salvia Linn.

Key to species.

1. Flowering stem not leafy .....2.
   Flowering stem leafy.....5.

Stachys Tashiroi Hayata sp. nov. Herba annua; caulis simplex 40–50 cm. longus glaber tetragonus. Folia opposita membranacea lanceolata vel lineari-lanceolata 5–6 cm. longa 1 cm. lata apice acuta vel acuminata basi late obtusissima vel obtusa margine serrulata utraque pagine glabra subtus pallidiora, petiolis 2–5 mm. longis glabris. Verticillastri racemosim superpositimque dispositi, racemis terminalibus simplicibus 10–15 cm. longis, verticillastris a se 5 mm.—20 mm. remotis, bracteis inferioribus cum foliis conformibus superioribus minoribus usque ad nullum reductis, pedicellis 1 mm., longis tenuiter hirsutis. Calyx campanulatus 5 mm. longus totiusque latus extus glaber intus glaber apice 5-lobatus, lobis triangularibus $2\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis apice acuminatis secus marginem et medium costatis margine glanduloso-ciliolatis. Corollæ tubus 6 mm. longus fauce 3 mm. latus supra basin latere anteriore subito contractus sursum dilatatus extus subglaber vel tenuiter hirsutus intus prope basin hirsuto-annulatus, limbo 2-labiato, labro superiore erecto obovato 4–5 mm. longo 4 mm. lato apice rotundato vel obtuso concavo, labro inferiore obtriangulari 7–8 mm. longo 7 mm. lato transverse patenti 3-lobato, lobis lateralibus oblique triangularibus 2 mm. longis apice rotundato-obtusis, lobo medio oblongo 5 mm. longo apice rotundato. Stamina 4 æquilonga, sub labro superiore ascendentia, filamentis hirsutis. Stylus apice 2-ramosus, ramis æquilongis $\frac{1}{4}$ mm. longis. Ovarium glabrum, partibus obovoideis.

Hab. Okinawa, leg. Y. Tashiro, Mai. 1887.

Near *Stachys aspera*; but distinguishable from it in having much narrower leaves and smaller flowers.

2. Leaves simple .....1. *S. scapiformis.*
Leaves compound .....3.
3. Hairs on scapes glandular .....2. *S. Hayatana.*
Hairs on scapes not glandular.....4.
4. Leaflets cordate or rounded at the base .....3. *S. keitaoensis.*
Leaflets mostly cuneate at the base.....4. *S. arisanensis.*
5. Leaves compound .....5. *S. Tashiroi.*
Leaves simple .....6.
6. Leaves oblong or oblong-spathulate .....6. *S. plebeia.*
Leaves triangular-hastate.....7. *S. formosana.*

1. **Salvia scapiformis** Hemsl. (Fig. 34–i, j.) Hemsl. Ind. Fl. Sin. II. p. 287; Bot. Mag. t. 6980.

Hab. Kelung.

Curious to say, our collections of the species come only from Kelung, although the species is recorded from Tamsui. It seems that the species is limited in the northern part of the island. It is also recorded from Szechuen of Central China, of which locality, however, I am very sceptical.

2. **Salvia Hayatana** Makino n. n. (Fig. 34–d-h).

Salvia scapiformis Hance var. *pinnata* Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 312, t. 17, (pro parte).

Hab. Urai; Taitō: Daikōkō. Distinguishable from *S. scapiformis, S. keitaoensis* and *S. arisanensis* by the glandular hairs on flowers and peduncles.

3. **Salvia keitaoensis** Hayata sp. nov. (Fig. 34–a-d). Herba perennis, rhizomatibus erectis; caulis 25-40 cm. longus ad basin foliatus sursum basi efoliatus sursum spiciformis subglaber vel minute hirsutus. Folia omnia radicalia vel basalia pinnata in ambitu oblonga 7 cm. longa 3 cm. lata, foliolo terminali ovato vel ovato-cordato 3–3½ cm. longo 2–3 cm. lato apice obtuso basi cordato membranaceo margine serrato, serris obtusissimis utraque pagine subglabro, petiolulo terminali 1 cm. longo hirsuto, foliolis lateralibus 2–3-jugis, jugis 1–1½ cm. a se remotis, multo minoribus ovatis vel ovato-cordatis 1–1½ cm. longis breve petiolulatis, petiolis communibus 3–4 cm. longis hirsutis, pilis longiusculis patentissimis. Spicæ verticillastrorum simplices rarius a basi ramosæ 8–25 cm. longæ, verticillastris inferioribus a se 3 cm. remotis superio-

ribus plus approximatis, bracteis minutis oblanceolatis 1½ mm. longis, pedicellis 1–2 mm. longis minute hirsutis. Calyx tubuliformi-campanulatus 5 mm. longus 3 mm. latus 2-labiatus, labro superiore triangulari 2 mm. longo plus minus recurvo apice 2-denticulato 3-carinato ad carinas angustissime alato glabro, labro inferiore recto triangulari 2 mm. longo 7-nervio apice 2-lobato, lobis acute triangularibus 1 mm. longis; calyx intus medio hirsutus. Corolla tubuloso-campanulata 7–8 mm. longa extus glabra 2-labiata, labro superiore erecto 3 mm. longo 3 mm. lato apice 2-lobato, lobis rotundatis margine plus minus ciliatis, labro inferiore 2 mm. longo 3-lobato, lobis lateralibus rotundatis 1½ mm. longis, lobo medio 2 mm. lato 1 mm. longo truncato; corollæ tubo medio intus hirsuto. Stamina perfecta 2, filamentis filiformibus 3 mm. longis, connectivis erectis rectis 4 mm. longis, parte superiore 3 mm. longa loculifera, parte inferiore brevissima ½ mm. longa haud loculifera; loculis antherarum singulis 1½ mm. longis ⅓ mm. latis. Stylus filiformis 8 mm. longus basi subito angulo recto recurvus subito erectus glaber apice 2-lobatus, lobo anteriore longiore 1 mm. longo, lobo inferiore brevissimo ¼ mm. longo. Ovarium glabrum, partibus obovoideis 1 mm. longis. Discus infra ovarium ½ mm. longus. Achænium glabrum elongato-oblongum 1⅚ mm. longum ⅚ mm. latum apice obtusum, partibus dorsali subplanis ventrali prismaticis triangularibus in sectione.

S. scapiformis Hance var. *pinnata* Hayata Gen. Ind. p. 58.

Hab. Keitao, ad 4000 ped. alt., leg. B. Hayata, Aprili. 1916.

Near *S. scapiformis* Hance, but differs from it by the pinnate hirsute leaves. The leaves of *S. scapiformis* are always simple and glabrous. There are also differences between the flowers of the new and the latter species. Consequently, I should think it better to regard them to be specifically different.

4. **Salvia arisanensis** Hayata sp. nov. (Fig. 34–k-m). Herba perennis; rhizoma erectum; caulis 30–20 cm. longus simplex subglaber vel minute hirsutus basi foliatus cæterum efoliatus. Folia omnia radicalia vel basalia membranacea pinnata in ambitu obovata vel oblonga 6 cm. longa 3 cm. lata 5–7-foliolata, foliolo terminali oblongo 3 cm. longo 2 cm. lato apice acuto-obtuso basi cuneato rotundato rarissime cordato margine serrato, serris obtusis, supra sparse hirsuto subtus pallidiore ad costas venasque dense hirsuto, petiolulo 5–10 mm. longo, foliolis lateralibus multo minoribus oblongo-ovatis obliquis 1½ cm. longis,

petiolis communibus 4–5 cm. longis patenti-hirsutis. Spicæ verticillastrorum simplices rarius basi ramos emittentes, verticillastris inferioribus 3–4 cm. a se remotis superioribus plus approximatis 5–2-floratis, bracteis minutis lanceolatis 2–3 mm. longis. Calyx tubulosus 6–7 mm. longus extus subglaber 3 mm. latus 2-labiatus, labro superiore triangulari 2 mm. longo 3 mm. lato apice plus minus cuspidato-acuto, labro inferiore triangulari 3 mm. longo apice alte 2-lobato, lobis acuto-triangularibus 2 mm. longis apice acutis; (calyx intus medio tenuiter barbatus extus subglaber); labro superiore 3-carinato ad carinas laterales subalato, labro inferiore 3-nervio vel cum nervis secundariis 7–8-nervio. Corolla campanulato-tubuliformis 1 cm. longa ad faucem 4 mm. lata extus dense hirsuta intus pauce hirsuta, labro superiore 4 mm. longo 2-lobato, lobis oblongis 4 mm. longis 2 mm. latis apice obtusis, labro inferiore 3-lobato, lobis lateralibus triangularibus rotundatis 2 mm. longis totiusque latis, lobo medio oblongo 2 mm. longo apice obtuso. Stamina perfecta 2 e basi labri inferioris oriunda, filamentis 2 mm. longis glabris, connectivis 3 mm. longis, loculo antheræ altro lineari $1\frac{1}{2}$ mm. longo altro nullo; corollæ tubus intus hirsutus: stylus glaber 9 mm. longus. Ovarium glabrum, partibus ovoideis; discus anteriore ad glandulam vix tumens.

Hab. Arisan, leg. B. Hayata, Aprili. 1912. Differs from *S. keitaoensis* by the much hirsute leaflets with much larger teeth.

5. **Salvia Tashiroi** Hayata sp. nov. Caulis erectus rectus tetragonus 100 cm. longus medio $2\frac{1}{2}$ mm. latus glaber. Folia radicalia cum petiolis 6–7 cm. longa pinnata, pinnis 3 minoribus; caulina longiora, media longissima cum petiolis 13 cm. longa 7 cm. lata 3-foliolata, foliolo terminali rhomboideo-ovato $4\frac{1}{2}$ cm. longo 3 cm. lato apice acuto basi late cuneato vel obtuso vel truncato margine serrato chartaceo utraque pagine glabro, petiolulo terminali $1\frac{1}{2}$ cm. longo, foliolis lateralibus sessilibus vel brevissime petiolulatis ovato-oblongis $3\frac{1}{2}$ cm. longis $2\frac{1}{2}$ cm. latis basi valde obliquis apice obtusis vel acutis, petiolis communibus 6–7 cm. longis; folia superiora simplicia. Inflorescentia terminalis 20 cm. longa vel axillaris. Verticillastri 5–7-florati, floribus sessilibus vel brevissime pedicellatis. Calyx tubulosus 5 mm. longus $2\frac{1}{2}$ mm. latus 2-labiatus, labro superiore semi-rotundato 2 mm. longo 3 mm. lato apice breve mucronato 3-nervio ad nervos laterales alato, alis $\frac{1}{3}$ mm. latis,

labro inferiore late triangulari 2 mm. longo 3 mm. lato 6-nervio apice alte 2-lobato, lobis cuspidato-acutis; calyx extus glanduloso-hirsutus intus ad faucem dense longeque hirsutus. Corolla 11 mm. longa 3 mm. lata tubuliformis extus breve hirsuta 2-labiata, labro superiore oblongo 4 mm. longo $1\frac{1}{2}$ mm. lato apice truncato ad centrum plus minus emarginato erecto, labro inferiore 3 mm. longo 3-lobato, lobis lateralibus semi-rotundatis minoribus 1 mm. longis totiusque latis, lobo medio late cuneato 2–3 mm. longo 5 mm. lato apice 2-lobato, lobis magnis divaricatis patentibus. Stamina perfecta 2 intra faucem latere anteriore oriunda, filamentis complanatis $1\frac{1}{2}$ mm. longis, connectivis 4 mm. longis, parte superiore 3 mm. longa valida loculifera, parte inferiore brevissima 1 mm. longa haud loculifera, loculis antherarum linearibus $1\frac{1}{2}$ mm. longis. Stylus glaber 12 mm. longus. Ovarium glabrum, partibus obovoideis $\frac{1}{2}$ mm. longis.

Salvia plectranthoides Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 311 (non Griff.)

Hab. Kōshūn, leg. Y. Tashiro, Aprili. 1896.

6. **Salvia plebeia** R. Br., Hayata l.c. p. 58.

7. **Salvia formosana** Hayata sp. nov. Herba perennis? Caulis simplex erectus 60 cm. longus ad inflorescentiam plus minus ramosus breve hirsutus versus medium multo-foliatus. Folia longe petiolata opposita ad medium caulis approximatim disposita membranaceo-chartacea triangulari-hastata 13–7 cm. longa 10–5 cm. lata apice subito cuspidato-acuminata basi hastata, lobis lateralibus hastæ apice cuspidato-acutis, margine serrulata supra primum hirsuta demum subglabra subtus ad costas nervos hirsuta cæterum subglabra, petiolis 12–7 cm. longis hirsutis vel subglabris. Racemi verticillastri erecti basi pauce ramosi vel simplices 10–20 cm. longi, verticillastris inferioribus a se 2 cm. remotis superioribus plus approximatis, bracteis ovatis inferioribus 1 cm. longis superioribus multo minoribus hirsutis vel subglabris; pedicellis 2 mm. longis hirsutis vel barbatis. Calyx oblique campanulatus 8–9 mm. longus 7–8 mm. latus extus longe barbatus rubro- vel flavo-punctatus 2-labiatus, labro superiore late triangulari 2 mm. longo 5 mm. lato apice breve cuspidato 3-nervio ad nervos laterales angustissime alato, labro inferiore triangulari 5 mm. lato totiusque longo apice alte 2-lobato, lobis 3 mm. longis triangulari-acuminatis;

calyx 15-nervatus intus glaber. Corolla 2 cm. longa flava, tubo 7 mm. longo infra medium contracto, extus basi glabra sursum hirsuta 2-labiata, labro superiore erecto lineari 1 cm. longo 4 mm. lato apice breve 2-lobato minute rubro-punctato intus ad latus basis labri superioris longe barbato; labro inferiore oblongo 8 mm. longo apice 3–lobato, lobis lateralibus semi-oblongis, lobo medio 3 mm. longo $3\frac{1}{2}$ mm. lato apice truncato; corolla intus basi hirsuto-annulata. Stamina perfecta 2, filamentis complanatis 4 mm. longis $\frac{3}{4}$ mm. latis, connectivis linearibus, partibus superioribus 6 mm. longis loculiferis, partibus inferioribus 3 mm. longis sterilibus, loculis antherarum oblongo-linearibus 5 mm. longis $1\frac{1}{2}$ mm. latis apice obtusis basi rotundatis. Stylus filiformis 3 mm. longus sursum deorsum recurvus apice 2-ramosus, ramo superiore 2 mm. longo, ramo inferiore longiore 3 mm. longo. Ovarium glabrum, partibus complanato-ovoideis $\frac{2}{3}$ mm. longis; discus pulviniformis $1\frac{1}{2}$ mm. latus 1 mm. longus.

Hab. Heirinbi, Giran, Shintiku, Ritōzan.

Differs from *S. nipponica* Miq. by the subglabrous leaves and in the minute red dots on the corolla.

Salvia omerocalyx Hayata sp. nov. Herba perennis. Rhizoma erectum; caulis erectus 40–20 cm. longus basi dense approximateque foliatus glaberrimus simplex sursum spiciformis. Folia omnia radicalia vel basalia longissime petiolata glaberrima pinnata, rarius simplicia, foliolis 3–5, foliolo terminali oblongo vel oblongo-ovato vel subrotundato $3\frac{1}{2}$–3 cm. longo membranaceo apice obtuso basi rotundato vel tenuiter cordato margine crenato, petiolulo terminali 3–5 mm. longo, foliolis lateralibus multo minoribus oblongis ovatis vel cordatis 1–2 cm. longis petiolulatis, petiolis communibus 8–10 cm. longis glabris. Spicæ verticillastri 5–15 cm. longæ; rhachis tenuiter hirsutis, verticillastris inferioribus a se 1–1.5 cm. remotis, superioribus plus approximatis 5–6-floratis, bracteis minutis. Calyx tubuloso-dilatatus 6 mm. longus 2-labiatus extus sparse glanduloso-hirtellus, labro superiore lato triangulari 2 mm. longo $2\frac{1}{2}$ mm. lato apice acuto ad summum brevissime 3-dentato, labro inferiore late triangulari 2 mm. longo $2\frac{1}{2}$ mm. lato apice acuto ad summum alte 2-lobato, lobis triangularibus apice acuminatis; calyx tenuiter 10-costatus latere dorsali 2-alato-carinatus ad carinas glanduloso-ciliolatus. Corolla 1 cm. longa, tubus 5 mm. longus 2 mm. latus extus subglaber intus medio hirsuto-annulatus, limbo extus sparse glanduloso-hirtello intus glabro 2-labiato, labro superiore erecto concavo oblongo 5 mm. longo 4 mm. lato apice emarginato basi plus minus contracto, labro inferiore majore 3-lobato, lobo medio late obovato 2 mm. longo 3 mm. lato apice retuso, lobis lateralibus oblongis 2 mm. longis $1\frac{1}{2}$ mm. latis patentibus. Stamina anteriora perfecta 2 ad faucem corollæ affixa, filamentis brevioribus glabris 2 mm. longis, connectivis longissimis cum filamento articulatis, partibus anterioribus 5–6 mm. longis apice loculum polleniferum gerentibus, partibus posterioribus brevissimis 2 mm. longis haud loculigeris, loculis polleniferis linearibus 2 mm. longis $\frac{1}{4}$ mm. latis. Stamina anteriora fere obsoleta, filamentis 1 mm. longis haud antheriferis. Stylus longe exsertus apice 2-fidus, ramo anteriore longiore 2 mm. longo, posteriore brevi $\frac{1}{2}$ mm. longo. Discus anteriore plus minus tumens. Ovarium glabrum, partibus ellipsoideis.

Hab. Tajima, Hattamura, leg. G. Koizumi, V. 1914.

Somewhat near to *S. scapiformis* Hance; but differs from it in the pubescent racemes, in the calyx with ciliate ridges and in the pinnate leaves.

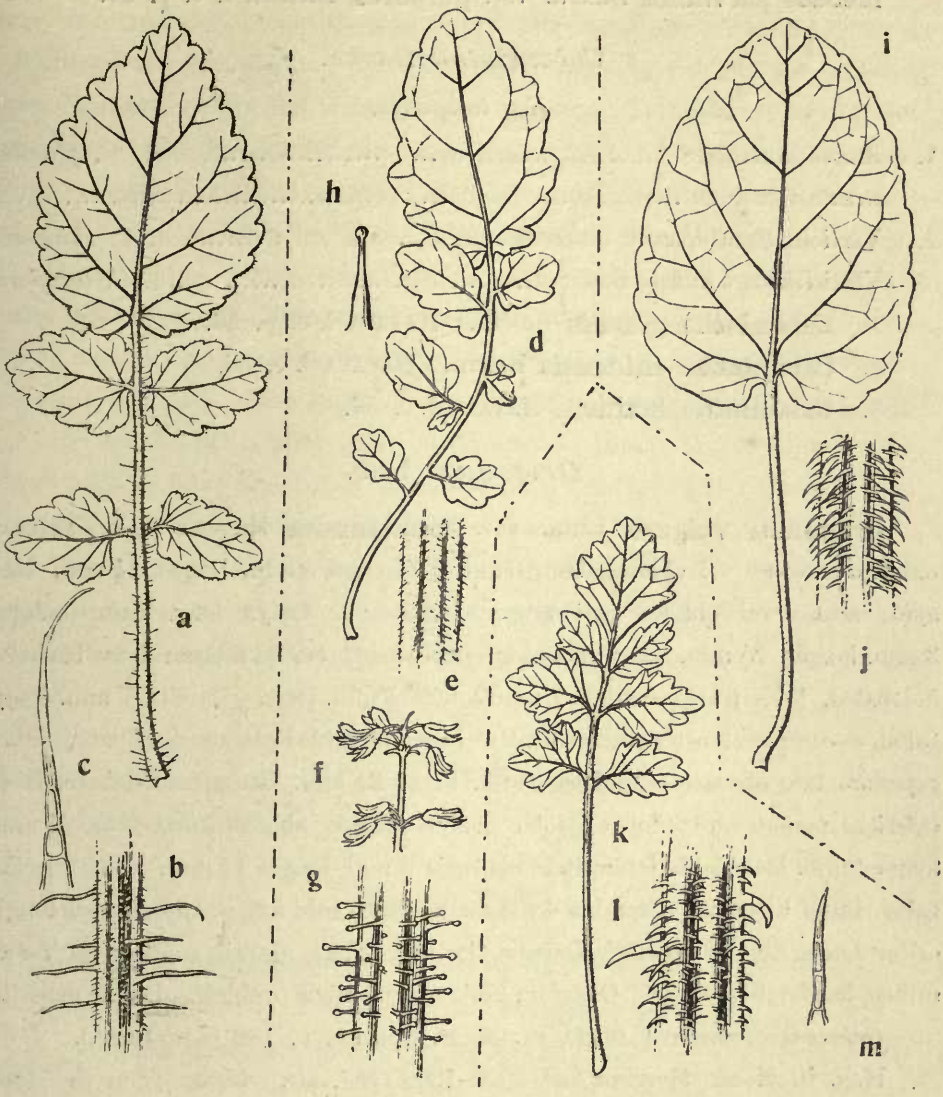

Fig. 34; a, a leaf of *Salvia keitaoensis* HAYATA; b, a portion of the petiole of the same species; c, a hair on the same; d, a leaf of *Salvia Hayatana* MAKINO; e, a portion of the petiole of the same species; f, a portion of a raceme of the same; g, a portion of the axis of the same; h, a glandular hair of the same; i, a leaf of *Salvia scapiformis* HANCE; j, a portion of the petiole of the same leaf; k, a leaf of *Salvia arisanensis* HAYATA; l, a portion of the petiole of the same leaf; m, a hair on the same.

Melissa Linn.

Melissa parviflora Benth. var. **purpurea** Hayata l. c. p. 57.

Calamintha Mœnch.

Key to species.

1. Bracts lanceolate .....1. *C. gracilis.*
   Bracts setaceous .....2.
2. Verticillasters densely flowered .....2. *C. chinensis.*
   Verticillasters loosely flowered.....3. *C. laxiflora.*

1. **Calamintha gracilis** Benth.; Hayata l. c. p. 56.
2. **Calamintha chinensis** Benth.; Hayata l. c. 56.
3. **Calamintha laxiflora** Hayata l. c. 56.

Origanum Linn.

Origanum vulgare Linn. var. **formosanum** Hayata n. v. Bracteæ oblongo-obovatæ vel oblanceolatæ tenuiter hirsutæ 5 mm. longæ $2\frac{1}{2}$ mm. latæ apice acutæ vel obtusæ basi anguste cuneatæ. Calyx longe campanulatus 3 mm. longus $2\frac{1}{2}$ mm. latus extus hirsutus intus glaber ad faucem dense barbatus 5-lobatus, lobis triangularibus 1 mm. longis $\frac{1}{2}$ mm. latis. Corolla 7 mm. longa tubuloso-campanulata extus tenuiter hirsuta intus glabra 2-labiata, labro superiore late obovato-rotundato 2 mm. longo $2\frac{1}{2}$ mm. lato apice 2-lobato, labro inferiore majore alte 3-lobato, lobo medio majore obovato-rotundato $2\frac{1}{2}$ mm. longo 2 mm. lato, lobis lateralibus obovatis 2 mm. longis $1\frac{1}{2}$ mm. latis; corollæ tubus intus hirsutus. Stamina 4 didynama fauce tubi affixa, anterioribus longioribus longe exsertis, posterioribus brevioribus, atheris glabris, connectivis T-formibus, loculis divaricatis. Ovarium glabrum, partibus ovoideis. Discus æqualis.

Origanum vulgare Hayata Fl. Mont. Formos. p. 182 (non Linn.).

Hab. in Monte Morrison, ad 8000–12000 ped. alt. Differs from the type by the oblanceolate bracts and more hirsute calyx.

Lycopus Linn.

Lycopus lucidus Turez. var. **formosanus** Hayata n. v. Caulis tetragonus ad angulos acutus vel plus minus tenuiter hirsutus ad nodos manifeste hirsutus

60–80 cm. longus pauce ramosus, ramis longissimis tenuissimis. Folia lanceolata 5 cm. longa 1 cm. lata apice acuminata basi acuta margine subintegra a medio sursum mucronibus ascendentibus remote instructa basi apiceque integra coriacea vel chartacea utraque pagine subglabra scabriuscula subtus pallidiora subtus impresso-punctata subtus ad costas hirsuta sessilia. Verticillastri densissime florati, bracteis cuspidato-ovatis 3–4 mm. longis 1 mm. latis apice cuspidatis validiuscule costatis. Flores sessiles. Calyx campanulatus $2\frac{1}{2}$ mm. longus 2 mm. latus glaber punctis flavis conspersus 5-lobatus, lobo postico minore triangulari 1 mm. longo, lobis ceteris majoribus $1\frac{1}{2}$ mm. longis apice acutis 1-costatis utraque glabris punctis flavis extus conspersis. Corolla subcampanulata 3 mm. longa $2\frac{1}{2}$ mm. lata fere actinomorpha extus glabra intus ad faucem dense longeque hirsuta 2-labiata, labro superiore late rotundato 1 mm. longo $1\frac{1}{2}$ mm. lato, labro inferiore 3-lobato, lobo medio late rotundato 1 mm. longo $1\frac{1}{2}$ mm. lato apice rotundato, lobis lateralibus semi-rotundatis 1 mm. longis totiusque latis. Stamina 2, antheris glabris, loculis divaricatis angulo 45° a se egressis linearibus $\frac{2}{3}$ mm. longis. Stylo glabro erecto 3–4 mm. longo apice 2-fido, ramo anteriore longiore $\frac{1}{2}$ mm. longo. Ovarium glabrum 4-partitum, partibus dorso complanatis apice rotundato-complanatis. Discus sub ovario situs anteriore plus minus elevatus.

Lycopus lucidus Hayata Gen. Ind. p. 57 (non Turez).

Hab. Sekiko, leg. G. Nakahara. Differs from the type by the nearly entire subglabrous, much narrower leaves.

Mentha Linn.

1. **Mentha neptoides** Lej.; Matsum. Jap. Nam. Pl. II. p. 250.
Dysophylla glabra Hayata Mater. Fl. Formos. p. 226.
2. **Mentha arvensis** Linn. var. **vulgaris** Benth.; Hayata l. c. p. 57.

Perilla Linn.

Perilla ocymoides Linn. var. **purpurascens** Hayata n. v.
Perilla ocymoides Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 309 pro parte (non Linn.).

Hab. Shizangan, leg. Y. Shimada. Differs from the type by the ovate leaves with cuneate base and by the purpurascent flowers. According to W. B. Hemsley, *Perilla nankinensis* would be only a cultivated condition of *P. ocymoides*. To this we concur.

Mosla Buch.-Ham.

Key to species.

1. Nutlets minutely glandular dotted.....1. *M. lysimachiiflora.*
   Nutlets not dotted .....2.
2. Nutlets thinly reticulate.....2. *M. formosana.*
   Nutlets strongly reticulate .....3. *M. leucantha.*

1. **Mosla leucantha** Hayata sp. nov. (Fig. 35–2). Herba basi suffruticosa annua; caulis tetragonus toto tenuiter hirsutus, ramis oppositis ascendentibus racemo terminatis. Folia chartaceo-membranacea ovato-oblonga vel oblonga 15 mm. longa 7–8 mm. lata apice acuta basi acuta vel late cuneata margine serrata utraque pagine glabra subtus impresso-punctata, petiolis 5 mm. longis. Racemi terminales 5–7 cm. longi, floribus oppositis, bracteis ovato-lanceolatis hirsutis, pedicellis 3 mm. longis hirsutis. Calyx extus densissime hirsutus subcampanulatus $1\frac{1}{2}$ mm. longus 2-labiatus intus subglaber. Corolla alba 2 mm. longa $1\frac{1}{2}$ mm. lata extus hirsuta intus glabra 2-labiata, labro superiore brevissimo ad centrum emarginato, labro inferiore 3-lobato, lobis lateralibus minutis rotundatis $\frac{1}{4}$ mm. longis, lobo medio late rotundato $\frac{2}{3}$ longo et lato margine crenulato vel subintegro. Stamina didynama, anterioribus brevioribus sterilibus, posterioribus longioribus fertilibus, ad faucem corollæ affixa, connectivis T-formibus minutis, loculis ad extremitates connectivorum affixis divaricatis a se angulo 45° egressis. Stylus glaber apice 2-fidus, ramo anteriore longiore. Ovarium glabrum, partibus obovoideis. Discus annularis, glanda columniformi $\frac{1}{5}$ mm. longa anteriore insita. Nucula distincte elevato-reticulata.

Hab. Kwannonzan; Biōritsu: Taiko. Near *Mosla punctata* Maxim.; but differs from it in the much smaller fruits.

2. **Mosla formosana** Maxim. (Fig. 35—1); Hayata l. c. p. 57.

3. **Mosla lysimachiiflora** Hayata sp. nov. (Fig. 35—3). Herba basi suffruticosa 60–70 cm. longa; caulis tetragonus subglaber. Folia chartaceo-

membranacea ovata 3 cm. longa 2 cm. lata apice triangulari-obtusa basi late cuneata basi integra a basi sursum dentato-serrata, serris triangularibus ascendentibus, utraque glabra subtus impresso-punctata, petiolis 1–2 cm. longis. Racemi terminales 5-6 cm. longi. Flores oppositi basi bracteis lanceolatis 5—2 mm. longis instructi, pedicellis 2–3 mm. longis brevissime hirsutis. Calyx campanulatus 2 mm. longus 3 mm. latus extus subglaber punctatus intus sparse longe hirsutus 2 labiatus, labro superiore 3-lobato, lobo medio minuto semi-rotundato $\frac{1}{2}$ mm. lato et longo, lobis lateralibus majoribus $1\frac{1}{2}$ mm. longis 1 mm. latis apice acutis medio 1-carinatis, labro inferiore alte 2-lobato, lobis oblongo-triangularibus $1\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis apice acutis 1-costatis. Corolla oblique campanulata 5–6 mm. longa 5 mm. lata tenuiter 2-labiata extus intusque

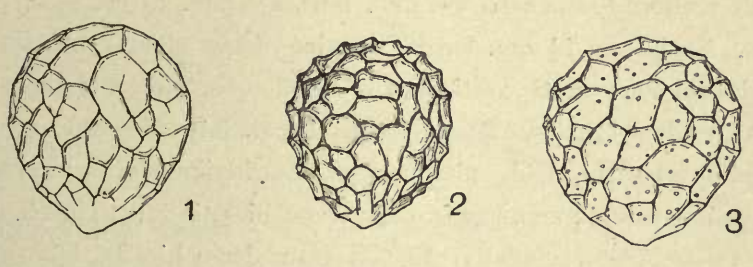

Fig. 35; 1, *Mosla formosana* Maxim.; 2, *Mosla leucantha* Hayata; 3, *Mosla lysimachiiflora* Hayata.

tenuissime hirsuta vel subglabra, labro superiore 1 mm. longo 2 mm. lato brevissime 2 lobato vel emarginato, labro inferiore majore 3-lobato, lobis lateralibus late semi-rotundatis 1 mm. longis $1\frac{1}{2}$ mm. latis apice rotundatis, lobo medio maximo late rotundato 3 mm. lato 2 mm. longo apice rotundato basi contracto margine denticulato supra tenuiter hirsuto. Stamina 4 didynama, anterioribus sterilibus brevioribus, posterioribus longioribus fertilibus exsertis, filamentis glabris, connectivis dilatatis vel brachiiformibus, loculis antherarum ad extremitates connectivi sitis. Stylus glaber 6 mm. longus apice 2-fidus, ramo anteriore longiore $\frac{1}{2}$ mm. longo. Ovarium glabrum, partibus rotundatis, glandula anteriore $\frac{1}{3}$ mm. longa. Nucula tenuiter reticulata punctata.

Hab. Tamsui, Taihoku.

Near *Mosla formosana* Maxim.; but distinguishable from it in the larger bracts and flowers.

Elsholtzia Willd.

Key to species.

Bracts ciliate, flowers bifariously spicate.....*E. formosana.*

Bracts not ciliate, flowers quadrifariously spicate .....*E. Oldhami.*

1. **Elsholtzia formosana** Hayata sp. nov.=*E. cristata* Hayata l. c. p. 56, (non Willd.). Herba annua? caulis 30–40 cm. longus tetragonus tenuiter hirsutus stramineus. Folia opposita ovata ovato-lanceolata 4–5 cm. longa 1½–2 cm. lata apice acuta vel acuminata basi subito cuneata membranacea basi integra sursum basi dentata supra minute hirsuta subtus subglabra distincte impresso-punctata, petiolis 1 cm. longis. Spicæ verticillastri 3–4 cm. longæ 1 cm. latæ ad apicem ramulorum terminales, bracteis mediis extus hirsutis intus glabris reniformi-rotundatis 6–7 mm. latis 4–5 mm. longis apice aristato-cuspidatis, cuspidibus 1½ mm. longis margine dense ciliatis utraque pagine minute glanduloso-punctatis, verticillastris 5–6-floratis, pedicellis glabris 1 mm. longis. Calyx late tubulosus 2 mm. longus 1 mm. latus dense hirsutus intus glaber apice 5-lobatus, lobis subæqualibus lineari-triangularibus apice acuminatis aristis instructis 1½ mm. longis extus dense hirsutis intus glabris. Corolla tubulosa versus apicem gradatim dilatata extus dense hirsuta, labro superiore 1 mm. longo totiusque lato apice medio late emarginato vel 2-lobato, lobis rotundatis, labro inferiore 3-lobato, lobis lateralibus minoribus rotundato-oblongis ½ mm. longis, lobo medio rotundato 1 mm. longo totiusque lato concavo. Stamina didynama, anteriora longiora longe exserta, posteriora breviora, filamentis glabris, antheris glabris, loculis divaricatis fere confluentibus. Discus annularis 4-dentatus, dentibus triangularibus, uno antico longiore columniformi ½ mm. longo. Ovarium glabrum 4-partitum, partibus obovoideis ½ mm. longis, stylo glabro 5 mm. longo apice 2-fido, ramis subæqualibus.

Hab. Rokujō-daizan.

Differs from *E. cristata* by the densely ciliate bracts and densely barbate calyx.

2. **Elsholtzia Oldhami** Hemsl.; Hayata l. c. p. 56.

Pogostemon Desf.

Pogostemon formosanus Oliver; Hayata Gen. Ind. p. 57.

Dysophylla Blume.

Key to species.

Leaves opposite lanceolate larger.....1. *D. auricularia*
Leaves verticillate linear smaller .....2. *D. verticillata.*

1. **Dysophylla auricularia** Blume; Hayata l. c. p. 56.
2. **Dysophylla verticillata** Benth.; Hayata l. c. p. 56.

Hyptis Jacq.

Key to species.

1. Verticillasters densely spicate or capitate .....2.
   Verticillasters loosely racemose .....1. *H. suaveolens.*
2. Verticillasters densely spicate .....2. *H. spicigera.*
   Verticillasters capitate .....3.
3. Peduncles of heads shorter, at most 1 cm. long.....3. *H. brevipes.*
   Peduncles of heads longer, 5 cm. long.....4. *H. capitata.*

1. **Hyptis suaveolens** Poit.; Hayata l. c. p. 57.
2. **Hyptis spicigera** Lam.; Hayata l. c. p. 57.
3. **Hyptis brevipes** Poit.; Hayata l. c. p. 57.
4. **Hyptis capitata** Jacq.; Hayata l. c. p. 57.

Plectranthus L'hérit.

Key to species.

Leaves hirsute on both sides .....1. *P. daitonensis.*
Leaves nearly glabrous on the upper side.....2. *P. lasiocarpa.*

1. **Plectranthus daitonensis** Hayata sp. nov. (Fig. 36–1). Herba basi suffruticosa 60–100 cm. longa; caulis tetragonus tenuiter hirsutus paullo ramosus, ramis gracillimis. Folia obovata vel rhomboideo-ovata apice triangulari-acuta basi cuneato-attenuata margine a medio sursum dentato-serrata supra tenuiter hirsuta subtus tenuissime hirsuta pallidiora subtus minutissime glanduloso-punctata, petiolis 2–3 mm. longis. Cymæ axillares vel terminales paniculam formantes, pedunculis 2–3 cm. longis apice 5–10-floratis, pedicellis 1–2 mm.

longis minute hirsutis. Calyx oblique campanulatus 3 mm. longus totiusque latus hirsutus intus glaber 10-costatus apice oblique 5-lobatus, lobis triangularibus apice acutis plus minus inæqualibus. Corollæ tubus 3 mm. longus exsertus basi postice gibbosus extus hirsutus intus glaber basi hirsutus declinatus medio suberectus; limbus 2-labiatus, labro postico breviter 4-fido, labro antico integro longiore concavo. Stamina 4 didynama declinata, filamentis edentulis liberis basi hirsutis, antheræ loculis divaricatis subdistinctis. Discus antice in glandulam ovario breviorem tumens. Stylus apice breviter 2-fidus, lobis subæqualibus acutis.

Hab. Daitonzan, leg. T. Kawakami, Juli. 1909.

2. **Plectranthus lasiocarpus** Hayata (Fig. 36) Mater. Fl. Formos. (1911) p. 224 Gen. Ind. p. 57. *Plectranthus serra* Hayata Gen. Ind. p. 57 (non Maxim.); *Plectranthus formosanus* Hayata et Nakai in Sched. Herb. Univ. Tōkyō. Herba circ. 60 cm. longa pauce ramosa; caulis erectus rectus pilis retrorsis brevissimis dense obtectus tetragonus facie sulcatus. Folia membranacea ovata 8 cm. longa 4 cm. lata apice acuta basi subito cuneata ad alam petiolorum abeuntia margine serrata, serris ascendentibus acutis plus minus superiore recurvis, utraque pagine subglabra vel tenuiter hirsuta, petiolis 1–2 cm. longis interdum nullis. Cymæ axillares vel terminales simplices vel paniculatim dispositæ, bracteis variabilis ovatis vel lanceolatis, pedicellis hirsutis.

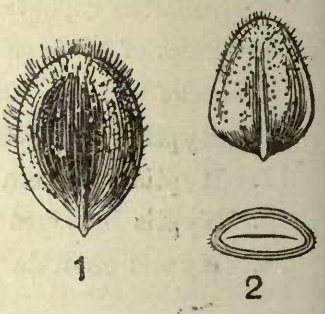

Fig. 36; *Plectranthus lasiocarpa* Hayata; 1, 2, different forms of the fruits.

Calyx oblique campanulatus extus hirsutus intus glaber 10-costatus, lobo postico minuto lineari-triangulari 1 mm. longo $\frac{1}{4}$ mm. lato apice acuminato, lobis anterioribus $1\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis. Corolla extus hirsuta, tubo 3 mm. longo $2\frac{1}{2}$ mm. lato basi contracto intus hirsuto, limbo bilabiato, labro posteriore reflexo 4-lobato 3–4 mm. longo, lobis semi-rotundatis, labro anteriore recto naviculiformi 4 mm. longo apice subacuto. Stamina didynama, 2-anterioribus longioribus, filamentis basi hirsutis, antheris glabris, loculis confluentibus. Stylus glaber superiore recurvus, ramis æqualibus. Ovarium apice dense hirsutum.

Hab. Taihoku, Tōyen.

Coleus Lour.

Key to species.

1. Leaves perfectly glabrous.....1. *C. Blumei.*
   Leaves more or less hairy.....2.
2. Pedicels 3-times longer than the flowers .....2. *C. mucosus.*
   Pedicels nearly equal the length of the flowers.....3. *C. formosanus.*

1. **Coleus Blumei** Benth.; Hayata l. c. p. 56.
2. **Coleus mucosus** Hayata l. c. p. 56.
3. **Coleus formosanus** Hayata l. c. p. 56.

Mesona Blume.

Mesona procumbens Hemsl.; Hayata l. c. p. 57.

Mesona elegans Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 305, t. 16.

This is perhaps a dwarf form of *Mesona procumbens* Maxim.; for in farther examination, I can not detect any difference in the floral structures.

Acrocephalus Benth.

Acrocephalus capitatus Benth.; Hayata l. c. p. 56.

Ocimum Linn.

Key to species.

1. Flowers minute, at most 2 mm. in length. Verticillasters densely spicate .....1. *O. Tashiroi.*
   Flowers larger, more than 3 mm. in length .....2.
2. Leaves glabrous, flowers larger .....2. *O. Basilicum.*
   Leaves densely hirsute, flowers smaller.....3. *O. sanctum.*

1. **Ocimum Tashiroi** (Matsum.) Hayata n.n. *Mosla Tashiroi* Matsum. in Sched. Herb. Tōkyō.

Hab. Holisha, leg. Y. Tashiro, Mart. 1896.

As the plant has 4 perfect stamens which are descending and lying on the lower lip of the corolla, it should be transferred to *Ocimum* from *Molsa* to which it was referred by Prof. J. MATSUMURA. The description will be given in the next volume.

2. **Ocimum Basilicum** LINN.; HAYATA l. c. p. 57.

3. **Ocimum sanctum** LINN.; HAYATA l. c. p. 57.

Aristolochiaceæ.

Aristolochia LINN.

Aristolochia Shimadai HAYATA (Pl. XIII.) Ic. Pl. Formos. VI. p. 36. Descriptio aucta :—Capsula pendula globoso-ovoidea 3 cm. longa 2½ cm. lata hexagona 6-costata loculicide dehiscens. Semina complanata triangulari-ovata 5 mm. longa 3 mm. lata apice obtusa basi rotundata dorso concava ventrali excavata sed medio prominente costata; testa membranacea.

HAB. Shintiku, Shinpo, leg. Y. SHIMADA.

Chelonopsis moschata MIQ. var. **lasiocalyx** HAYATA n. v. Herba basi fruticosa annua; caulis erectus simplex tetragonus 30-40 cm. longus rectus a medio sursum foliatus leviter hirsutus fusco-purpureus. Folia opposita oblonga vel oblongo-lanceolata 10 cm. longa 4 cm. lata apice acuminata vel acuminatissima basi acuta obtusa vel obtusissima chartaceo-membranacea margine dentata, dentibus triangularibus ascendentibus, supra minute hirsuta subtus pallidiora ad costas venasque pilosa, petiolis 5 mm. longis hirsutis. Flores ad axillas foliorum superiorum solitarii, pedicellis 5 mm. longis hirsutis, bracteis versus apicem pedicellorum 1–2 instructis lanceolatis 7 mm. longis 2 mm. latis hirsutis. Flores horizontaliter dispositi. Calyx subcampanulatus 1½ cm. longus 1 cm. latus hirsutus apice 5-lobatus, lobis subæqualibus triangulari-oblongis 5 mm. longis 3 mm. latis apice obtuso-acutis basi haud contractis margine integris intus glabris. Corolla albo-purpurascens tubiformis 3½ cm. longa 13 mm. lata basi plus minus contracta 4 mm. lata ad faucem 13 mm. lata extus versus apicem hirsuta cæterum glabra intus basi hirsuta cæterum glabra, labro superiore brevissimo late rotundato-triangulari 5 mm. longo 8 mm. lato apice obtuso-truncato basi plus minus contracto utraque pagine tenuissime hirsuto apice haud emarginato, labro inferiore majore 3-lobato, lobo medio semirotundato 8 mm. longo apice rotundato 12 mm. lato margine denticulato-crenulato basi contracto horizontaliter patenti, lobis lateralibus brevioribus semi-rotundatis 4 mm. longis totiusque latis. Stamina 4 subæqualia basi corollæ affixa, filamentis rectis 2½ cm. longis plus minus hirsutis, antheris per paria approximatis, connectivis latissimis, loculis divaricatis ad apicem connectivi sitis utraque extremitate et medio fasciculis pilorum instructis, pilis albis 1 mm. longis. Stylo glabro 2½ cm. longo apice 2-fido, ramis inæqualibus, ramo superiore minus quam 1 mm., inferiore plus quam 1 mm. longo. Discus annularis ½ mm. altus glanda una 2 mm. longa incrassata anteriore instructus. Ovarium glabrum 4-partitum, partibus rotundatis 1 mm. longis totiusque latis.

HAB. Ashitaka, Juli. 1917.

Differs from the type by the hirsute leaves and calyx and by the much broader bracts.

Loranthaceæ.

Loranthus Linn.

Loranthus Kæmpferi Maxim. Mél. Biol. IX. p. 612; Franch. et Sav. Enum. Pl. Jap. II. p. 482; Matsum. Ind. Pl. Jap. II.—2, p. 48.

Hab. Nantō: inter Ushōkō et Keitao, leg. R. Kanehira et S. Sasaki, No. 92.

Resembles very much the named species. As the specimen lacks flowers, the determination is rather conjectural.

Urticaceæ.

Ficus Linn.

In working up the genus, I found it extremely difficult to follow the system given by George King in his elaborate work, "The Species of *Ficus* of the Indo-Malayan and Chinese Countries," in Annals of the Royal Botanic Garden, Calcutta, Vol. I. (1887–1888); for the herbarium-materials can never be sufficient enough to consider the characters of all the kinds of flowers. To meet the practical purpose, I did not follow any system, but classified the species, according to their leaves, habits and shapes of the receptacles, without going into details as to the characters of flowers.

Key to species.

1. Scandent or creeping shrubs.....2.
   Erect shrubs or trees .....8.
2. Adult leaves less than 1½ cm. long; prostrate; receptacles nearly globose, less than 1 cm. in diameter.....1. *F. vaccinioides.*
   Adult leaves more than 2 cm. long, (if smaller, neither creeping nor prostrate) .....3.
3. Receptacles smaller than 1½ cm. in diameter.....4.
   Receptacles more than 3 cm. in diameter .....6.
4. Stem very slender, scandent but not prostrate; leaves linear obovate entire

or lobate, chartaceous, but not coriaceous .....2. *F. tannœnsis.*

Stem not very slender, climbing; leaves entire oblong-lanceolate or lanceolate, coriaceous.....5.

5. Receptacles 1½–2 cm. in diameter, more or less rostrate at the apex usually hirsute (hairs brown); stamen linear apiculate .....3. *F. arisanensis.*

Receptacles nearly the same size as, or a little smaller than the preceding, not or slightly apiculate at the apex, nearly glabrous ...4. *F. foveolata.*

6. Leaves minutely pitted on the under surface, pits filled with hairs ....5. *F. terasœnsis.*

Leaves not pitted on the under surface, hirsute .....7.

7. Receptacles ellipsoid .....6. *F. Awkeotsang.*

Receptacles urceolate.....7. *F. pumila.*

8. Receptacles mostly axillary .....9.

Receptacles mostly in fascicles on trunks or branches .....24.

9. Leaves glabrous, quite smooth.....10.

Leaves hirsute or scabrous, but not smooth.....18.

10. Leaves membranaceous or chartaceous; small shrub; leaves variable ....8. *F. formosana.*

Leaves coriaceous .....11.

11. Leaves obovate rounded at the apex, cuneate at the base; small shrub on sea-shore .....9. *F. garanbiensis.*

Leaves never rounded at the apex.....12.

12. Lateral nerves (or basal veins) parallel with primary lateral veins .....13.

Lateral nerves (or basal veins) not parallel with primary lateral veins...14.

13. Leaves shortly tailed at the apex; tails at most 5 mm. long, very obtuse at the apex.....10. *F. retusa.*

Leaves abruptly long-tailed at the apex; tails 1 cm. long, slightly obtuse at the apex.....11. *F. cuspidato-caudata.*

14. Leaves tri-nerved at the base .....12. *F. Wightiana.*

Leaves pinni-nerved.....15.

15. Leaves with middle lateral veins diverging from the costa at 70°–80°, cuspidate at the apex .....13. *F vasculosa.*

Leaves with middle lateral veins diverging from the costa at 60°–40°...16.

16. Leaves obovate triangularly obtuse at the apex.....14. *F. leucantatoma.*
Leaves oblong lanceolate or obovato-oblong more or less caudate at the apex .....17.

17. Leaves minutely dotted on the under surface.....15. *F. Harlandi.*
Leaves not at all dotted on the under surface .....16. *F. nervosa.*

18. Leaves hirsute .....19.
Leaves scabrous but not hirsute.....20.

19. Leaves linear .....17. *F. koshunensis.*
Leaves oblong or obovately oblong.....
.....18. *F. Beecheyana.*=*F. maruyamensis.*

20. Leaves obovate or elliptical, very obtuse or triangularly acute, neither caudate nor acuminate.....19. *F. Swinhœi.*
Leaves acuminate or caudate .....21.

21. Leaves cuneate at the base.....22.
Leaves rounded at the base.....23.

22. Leaves small oblongo-lanceolate nearly 6 cm. long.....20. *F. Kingiana.*
Leaves oblong usually 10 cm. long .....21. *F. gibbosa.*

23. Leaves equal at the base .....22. *F. Kusanoi.*
Leaves unequal at the base .....23. *F. Somai.*

24. Leaves slightly cordate at the base .....25.
Leaves not cordate at the base .....26.

25. Leaves oblong, not rounded .....24. *F. antaœnsis.*
Leaves nearly rounded .....25. *F. hieranensis.*

26. Leaves nearly trinerved .....27.
Leaves never trinerved.....28.

27. Ovary stipitate above the perianth.....26. *F. Konishii.*
Ovary not stipitate above the perianth.....27. *F. glochidiifolia.*

28. Leaves oblique at the base .....28. *F. kotœnsis.*
Leaves cuneate or obtuse at the base .....29.

29. Leaves cuneate at the base.....29. *F. kaukauensis.*
Leaves obtuse at the base.....29. *F. ochobiensis.*

1. **Ficus vaccinioides** Hemsl.; Hayata. l. c. p. 69.

2. **Ficus tannœnsis** Hayata (Pl. XIV. et Fig. 37) Ic. Pl. Formos. VII. p. 36.

Forma **angustifolia.** Folia linearia.

Hab. Tannō, Suō.

Forma **rhombifolia.** Folia obovato-oblonga vel obovata 3-lobata, lobo medio triangulari-cuspidato.

Hab. Taroko, Kaukaukei.

3. **Ficus arisanensis** Hayata sp. nov. (Fig. 38, 40—1, 2) Frutex ad truncos arborum crescens et scandens, ramis rugosis minute lenticellatis. Folia alterna lanceolata ovato-lanceolata 14 cm. longa 3½cm. lata apice acuminata vel acuminatissima basi obtusa vel acuta margine subintegra supra glabra subtus subglabra, costis venisque supra haud vel vix elevatis sed subtus prominente elevatis, venis primariis lateralibus utroque latere costæ 8–9, mediis a costa angulo 45° egressis, subtus sub lente minute foveolata coriacea, costa subtus sparse barbis longis adpressis conspersa, subtus fulvo-cineracea, petiolis 1½–2 cm. longis dense fulvo-hirsutis. Receptacula ad axillas foliorum gemina vel solitaria sessilia subglobosa 17 mm. longa 14 mm. lata apice bracteis circum oria rostrata, rostris 2–3 mm. longis, dense vel sparse fulvo-hirsuta; bracteis 3 ad basin receptaculi dispositis triangulari-ovatis 5 mm.

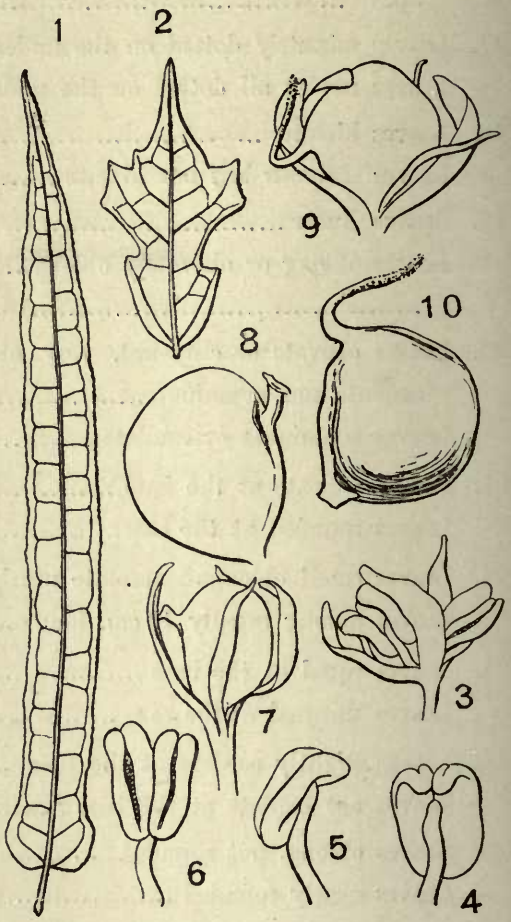

Fig. 37; *Ficus tannœnsis* Hayata; 1, a leaf of *F. tannœnsis* form. *angustifolia;* 2, a leaf of *F. tannœnsis* form. *rhombifolia;* 3, a male flower; 4, 5, 6, stamens, seen from different sides; 7, a gall flower; 8, gall ovary; 9, a female flower; 10, a fruit.

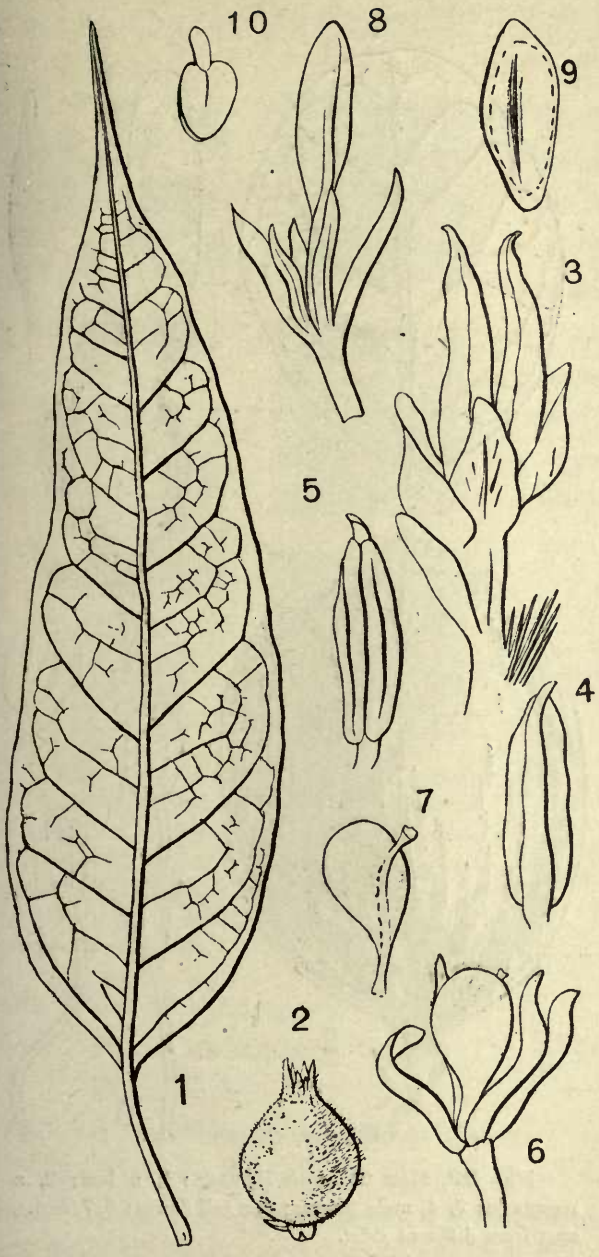

Fig. 38; *Ficus arisanensis* HAYATA; 1, a leaf; 2, a receptacle; 3, a male flower; 4, 5, stamens, seen from different sides; 6, a gall-flower; 7, a gall-ovary; 8, a female flower; 9, a fruit; 10, an embryo.

longis 3 mm. latis dorso hirsutis apice acutis, bracteis circum oria 3-seriatim dispositis triangularibus 2–3 mm. longis dense fulvo-hirsutis. Fl. ♂ stipitati, stipitibus 3 mm. longis sparse hirsutis basi bracteis 1 instructis, perianthii segmenta 3–4 oblonga 2 mm. longa obtusa; stamina 2, filamentis validiusculis 1 mm. longis, antheris ellipticis 2 mm. longis 1 mm. latis apice apiculatis. Fl. gall. stipitati, stipitibus 2 mm. longis, perianthii segmenta 4, segmentis linearibus 2½ mm. longis apice obtusis; ovarium galliferum supra perianthium stipitatum, stipite 1 mm. longo, oblique obovatum 1½ mm. longum basi attenuatum; receptaculum intus dense setulo-sohirsutum. Fl. ♀ ovarium obovoideum 1½ mm. longum, stigmate 1 mm. longo filiformi.

HAB. Arisan, Keitao.

Near *F. foveolata*, but differs from it by the densely hirsute receptacles. The leaves of the new species

are minutely pitted on the under surface; while those of *F. foveolata* have only impressed intravenal areas, but are not pitted.

4. **Ficus foveolata** WALL.; HAYATA l. c. p. 69.

5. **Ficus terascœnsis** HAYATA sp. nov. (Fig. 39, 40—3, 4) Ad truncos arborum scandens, ramis rugosis lenticellatis. Folia chartacea vel coriacea oblongo-rotundata $5\frac{1}{2}$ cm. longa 4 cm. lata apice rotundata vix emarginata basi obtusissima margine integra, costa cum venis supra haud elevata subtus prominente elevata, venis lateralibus primariis utroque latere costæ 4–5 sursum arcuatis, subtus pallidiora minute foveolata, foveolis dense hirsutis, petiolis 1 cm. longis. Receptacula ad axillas foliorum solitaria ellipsoidea 7 cm. longa 5 cm. lata apice rotundato-obtusa vel cum bracteis circum oria receptaculi obtusis apiculata basi ad stipitem 5 mm. longum attenuata glabra, bracteis ad basin receptaculi 3–4 dispositis triangularibus 2–3 mm. longis, pedunculis 1 cm. longis. Receptaculum galliferum cum fl. gall. et fl. ♂. Fl. ♂ longe

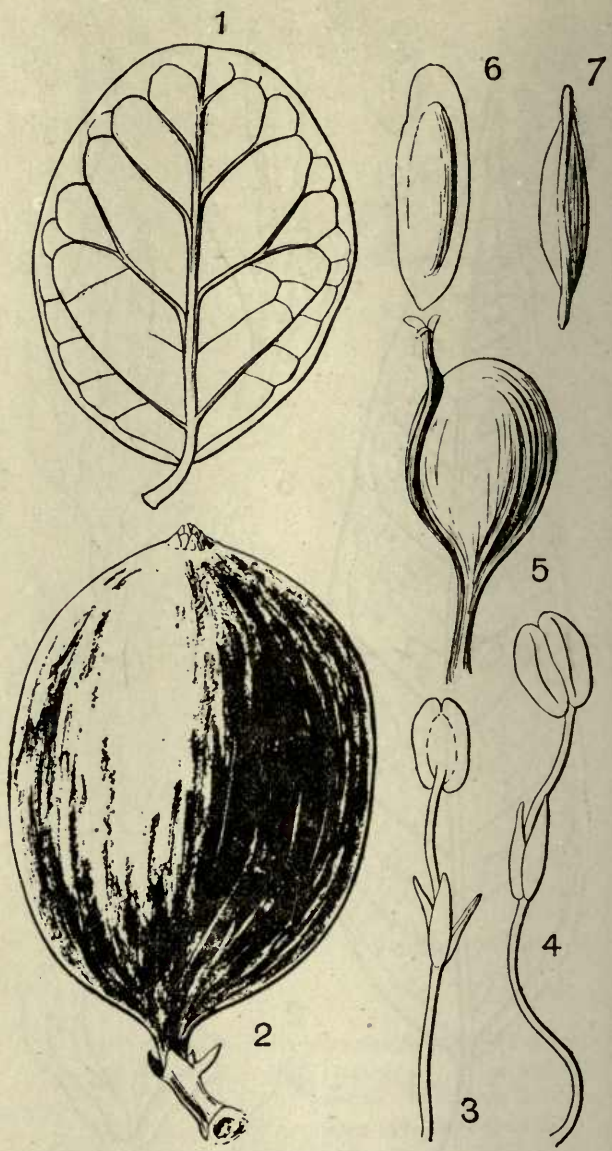

Fig. 39, *Ficus terascœnsis* HAYATA; 1, a leaf; 2, a receptacle; 3, 4, male flowers; 5, a gall flower; 6, 7, fruits, seen from different sides.

pedicellati, pedicellis 4 mm. longis; perianthii segmenta 3 basi plus minus connata lanceolata 1 mm. longa; stamen 1; filamentis 2–3 mm. longis, antheris ellipticis complanatis $1\frac{1}{2}$ mm. longis 1 mm. latis. Fl. gall.: perianthium ignotum; ovarium gall. oblique obovoideum 2 mm. longum $1\frac{1}{2}$ mm. latum apice rotundatum basi subito ad stipitem attenuatum, stipitibus 2–$2\frac{1}{2}$ mm. longis. Fructus obovoideo-fusiformis $2\frac{1}{2}$ mm. longus 1 mm. latus apice obtusissimus basi acutus.

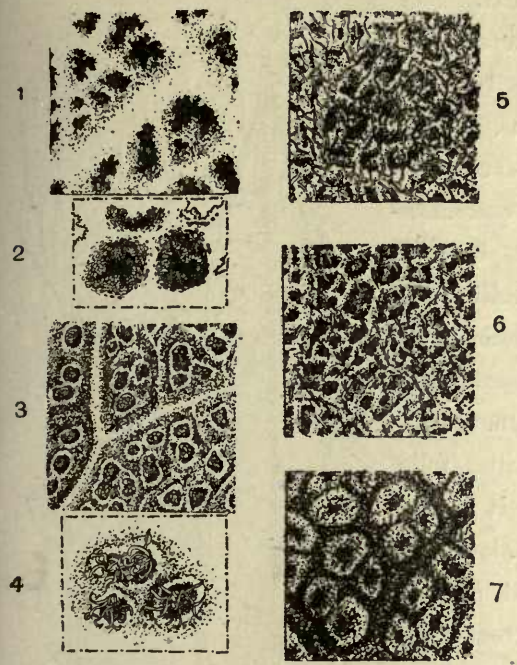

Fig. 40; 1, the portion of the under surface of a leaf of *F. arisanensis*; 2, the same, more enlarged; 3, a portion of that of *F. terasœnsis*; 4, the same, more enlarged; 5, that of *F. pumila*; 6, that of *F. Awkeotsang*; 7, that of *F. foveolata*; 1, 3, 5, 6 and 7, are magnified in the same proportion.

Hab. Teraso, Hieranzan, Juni. 1912, leg. B. Hayata et S. Sasaki.

Near *F. Awkeotsang* Makino; but differs from it by the nearly rounded leaves. Also near *Ficus callicarpa* Miq. (King Sp. Fic. Indo-Malay. p. 69, tt. 90, 101, B.), but differs from it by the elliptical receptacles and in the male flowers with emarginate anthers.

6. **Ficus Awkeotsang** Makino (Fig. 40–6); Hayata l. c. p. 69.

7. **Ficus pumila** Linn. (Fig. 40–7); Hayata l. c. p. 69.

8_a. **Ficus formosana** Maxim.; Hayata l. c. p. 69.

F. pyriformis Hemsl. Ind. Fl. Sin. II. p. 466, pro parte (non Hook. et Arn.); Matsum. et Hayata Enum. Pl. Formos. p. 378.

Ficus taiwaniana Hayata Gen. Ind. p. 69.

Female receptacles of this species are usually shorter and more rounded than the gall-receptacles. The latter are usually more or less elongated and pyriform.

8*b*. **Ficus formosana** Maxim. forma **Shimadai** (Fig. 41).

Hab. Sankakuyū, leg. Y. Shimada.

9. **Ficus garanbiensis** Hayata sp. nov. (Fig. 42) Frutex ad litus crescens 1–2 ped. alt. basi repens sursum ascendens. Folia coriacea obovata 5–9 cm. longa $2\frac{1}{2}$–5 cm. lata apice rotundata basi cuneata ad extremitatem obtusa margine integra basi 3-nervia utraque pagine glaberrima, venis lateralibus primariis utroque latere costæ 5–6 rectis prope marginem subito arcuatis, venis supra haud subtus vix elevatis, petiolis 1–2 cm. longis. Receptacula tenuiter hirsuta ad axillas foliorum solitaria, pedicellis 2 cm. longis glabris erectis, pyriformia $1\frac{1}{2}$ cm. longa 1 cm. lata apice acuto-obtusa basi subito attenuata ad stipitem 3–4 mm. longum abeuntia, bracteis basi receptaculi 3 dispositis late triangularibus 2 mm. latis 1 mm. longis hirsuto-villosis, pedunculis 3 cm. longis hirsutis. Fl. ♂ : pedicellis 2 mm. longis, basi bracteis singulis instructis. Perianthii segmenta 2–4 oblonga 1 mm. longa obtusa acuta. Stamina 2–4, filamentis $\frac{1}{3}$ mm. longis glabris, antheris late oblongis 1 mm. longis utraque emarginatis. Fl. gall. subsessiles, perianthii segmenta 3–5 linearia $1\frac{1}{2}$–2 mm. longa $\frac{1}{4}$ mm. lata acuminata. Ovarium galliferum oblique globosum 1 mm. in diametro basi supra perianthium stipite $\frac{1}{2}$ mm. longo instructum.

Hab. ad litus Kankao, leg B. Hayata Juni. 1912 (typus); Garanbi et Kwashōtō, leg. T. Sōma.

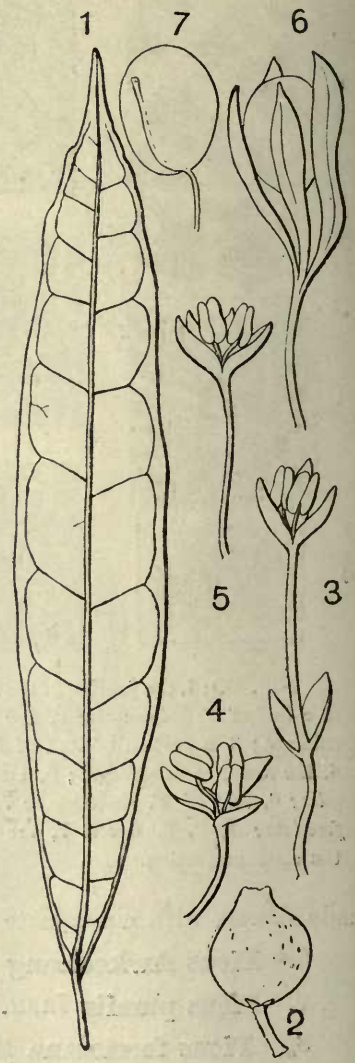

Fig. 41; *Ficus formosana* Maxim. form. *Shimadai*; 1, a leaf; 2, a gall-receptacle; 3, 4, 5, male flowers, seen from different sides; 6, a gall-flower; 7, a gall-ovary.

Near *F. Swinhœi* KING.; but differs from it in the obovate leaves with the much more rounded apex and the much more cuneate base.

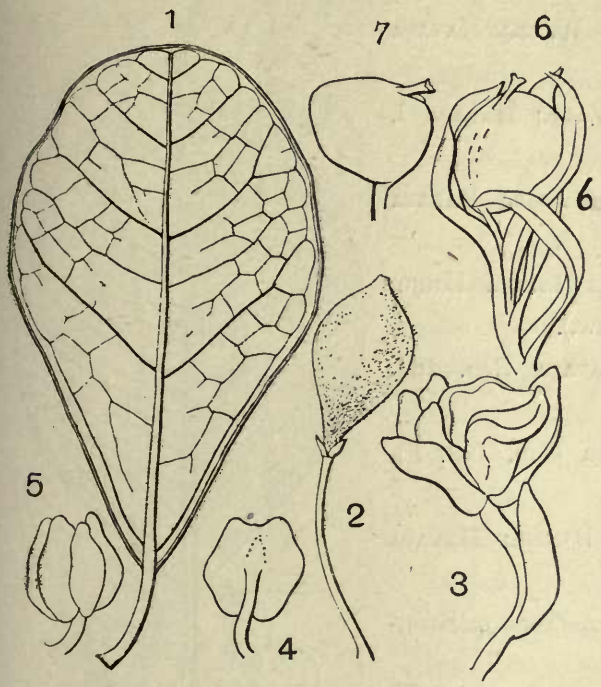

Fig. 42; *Ficus garanbiensis* HAYATA; 1, a leaf; 2, a receptacle; 3, a male flower; 4, 5, stamens; 6, a gall-flower; 7, a galliferons ovary.

10. **Ficus retusa** LINN.; HAYATA l. c. p. 69.

11. **Ficus cuspidato-caudata** HAYATA sp. nov. (Fig. 43) Arbor radices aërias haud emittens 70–80 ped. altus, ramis fulvo-cineraceis rugulosis lenticellis minutis notatis. Folia coriacea oblonga vel obovato-oblonga 6–7 cm. longa 4–4½ cm. lata apice subito cuspidato-caudata, (caudis circ. 1 cm. longis 2 mm. latis apice obtusis), basi acuta margine integra, venis venulisque supra minus subtus plus distincte elevatis, venis lateralibus primariis utroque latere costæ 8–9, venis secundariis cum primariis parallelis, venis tertianis minute distincteque reticulatis, petiolis 2½–3 cm. longis. Receptacula plus minus depressa globosa 6–7 mm. longa 7–8 mm. lata ad apicem subplana ad centrum tenuiter depressa basi sessilia subplana ad latus ramulorum oppositim sita glabra lævia, bracteis ad basin receptaculi 3 ovato-triangularibus 2 mm. longis. Fl. gall. breve pedicellati, pedicellis 1 mm. longis glabris, perianthii segmenta 3 obovata 1 mm. longa apice rotundata. Ovarium (gall.) obovoideum 1 mm. longum vel ovoideum. Receptaculum intus glabrum.

HAB. Kwashōtō, leg. T. SŌMA, Juli. 1913.

Near *F. Benjamiana* LINN.; but differs from it in having much more narrowly cuspidate leaves with more or less cuneate base. This new species

is easily distinguishable from *F. retusa* in not having fibrous ærial roots and in the cuspidate leaves.

12. **Ficus Wightiana** Wall.; Hayata l. c. p. 70.

13. **Ficus vasculosa** Wall.; Hayata l. c. p. 70.

14. **Ficus leucantatoma** Poir.; Hayata l. c. p. 69.

Ficus fistulosa Matsum. et Hayata Enum. Pl. Formos. p. 377 (non Reinw.).

F. Oldhami Hance.; Hayata Gen. Ind. Fl. Formos. p. 69.

F. rapiformis Hayata in Gen. Ind. Fl. Formos. p. 69 (non Roxb.)

15. **Ficus Harlandli** Benth.; Hayata l. c. p. 69.

Hab. Kusshaku, Karapin, Teraso, Kusukusu, Hiiranzan.

This species is easily distinguished from *F. obscura* in the leaves which in *F. Harlandi* are usually pinninerved, but in *F. obscura* are 3-nerved at the base.

16. **Ficus nervosa** Heyne.; Hayata l. c. p. 69.

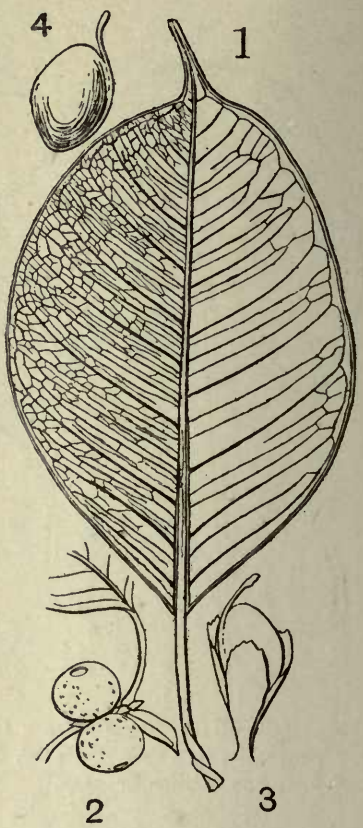

Fig. 43; *Ficus cuspidato-caudata* Hayata; 1, a leaf; 2, receptacles; 3, a gall-flower; 4, galliferous ovary.

17. **Ficus koshunensis** Hayata (Fig. 44) l. c. p. 69.

18. **Ficus Beecheyana** Hook. et Arn.; Hayata l. c. p. 69.

19. **Ficus Swinhœi** King. (Fig. 45); Hayata l. c. p. 69.

20. **Ficus Kingiana** Hemsl. (Fig. 46) in Hook. Ic. Pl. t. 2535; Matsum. et Hayata Enum. Pl. Formos. p. 380; Hayata Gen. Ind. p. 69.

Hab. Kōshūn, Kuraru, leg. B. Hayata, Juni. 1912.

Comparable to some extents to *F. gibbosa* Blume.; but differs from it in having much more smaller leaves.

21. **Ficus gibbosa** Bl.; Hayata l. c. p. 69.

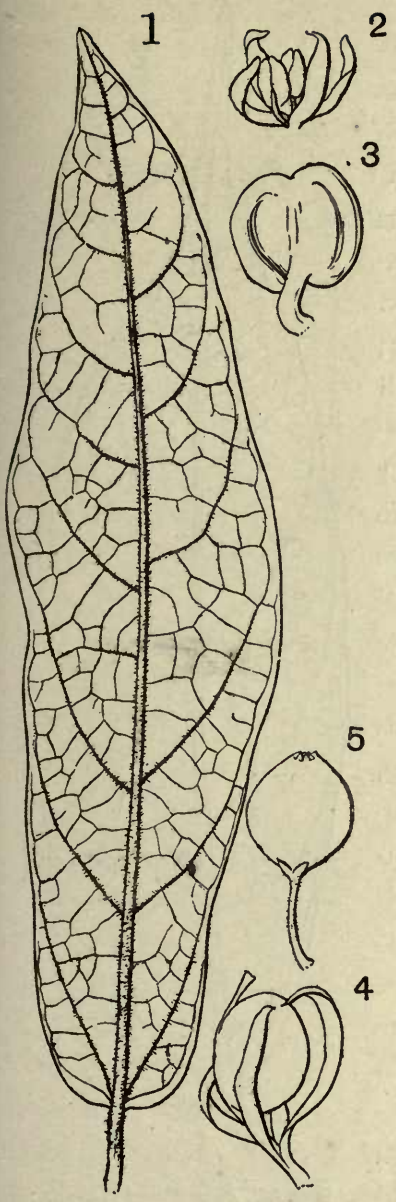

Fig. 44, *Ficus koshunensis* HAYATA; 1, a leaf; 2, a male flower; 3, a stamen; 4, a gall-flower; 5, a receptacle.

22. **Ficus Kusanoi** HAYATA (Fig. 47) l. c. p. 69.

23. **Ficus Somai** HAYATA. sp. nov. (Fig. 48). Frutex; rami graciles scaberrimi haud lenticellati rubescentes. Folia ovato-lanceolata valde obliqua 16 cm. longa $4\frac{1}{2}$ cm. lata apice acuminata vel caudato-acuminata basi inæqualia latere inferiore obtusa vel rotundata latere superiore acuta margine medio subintegra, costa cum venis utraque pagine elevata, utraque pagine scaberrima basi 3-nervia chartacea vel tenuiter coriacea in exsiccato pallido-cinerascentia, petiolis 1 cm. longis. Receptaculum axillare solitarium subglobosum 1 cm. longum 8 mm. latum, pedunculis 2–3 mm. longis, bracteis basi receptaculi triangularibus dense breveque hirsutis.

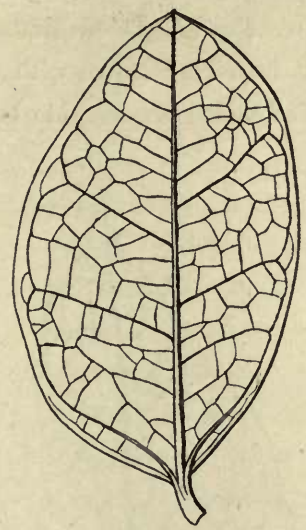

Fig. 45, *Ficus Swinhœi* KING.

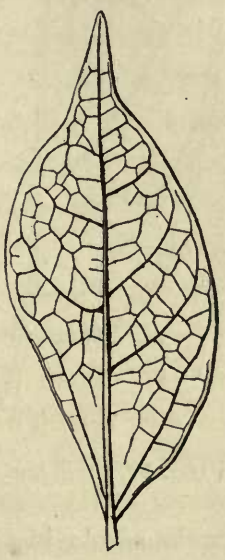

Fig. 46, *Ficus Kingiana* HEMSL.

Receptaculum intus hirsutum. Fl. ignoti.

HAB. Takao, leg. T. SŌMA.

Near *F. gibbosa* BLUME; but separable from it in having leaves with the oblique base which is rounded on one side but acute on the other.

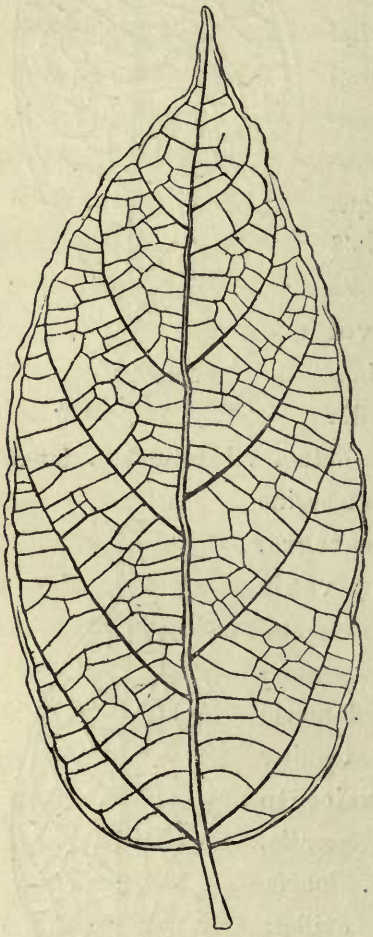

Fig. 47, *Ficus Kusanoi* HAYATA.

24. **Ficus antaœnsis** HAYATA sp. nov. (Fig. 49) Arbor; rami et ramuli crassiusculi, ramulis teretibus 1 cm. in diametro sectionis, cortice fulvo-rubescenti ruguloso minute lenticellato, lenticellis minutis rubescentibus, cicatricibus foliorum semi-rotundatis 5 mm. latis notatis et cicatricibus stipularum annuliformibus. Folia elliptica chartaceo-coriacea 20 cm. longa 10–13 cm. lata apice caudato-acuta basi rotundato-truncata ad extremitatem tenuiter cordata margine subintegra vel plano-undulata utraque pagine glabra, nervis venis venulis reticulis venularum gracilibus supra tenuissime impressis subtus elevatis, 5-nervia

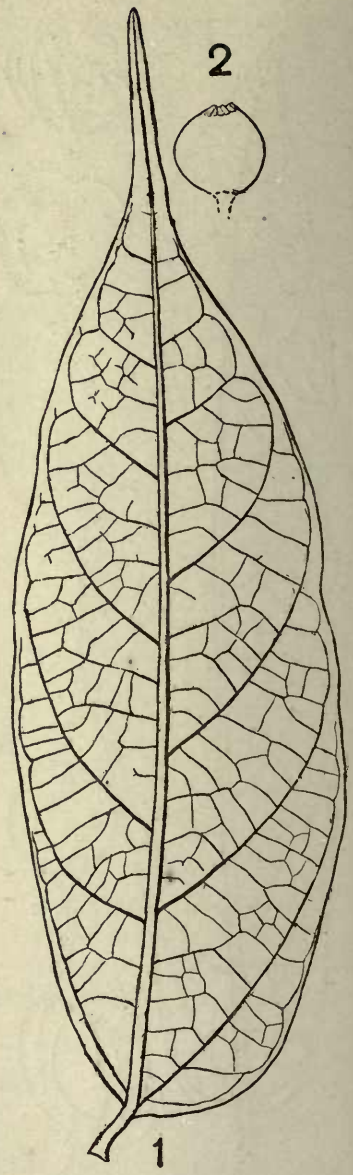

Fig. 48, *Ficus Somai* HAYATA; 1, a leaf; 2, a receptacle.

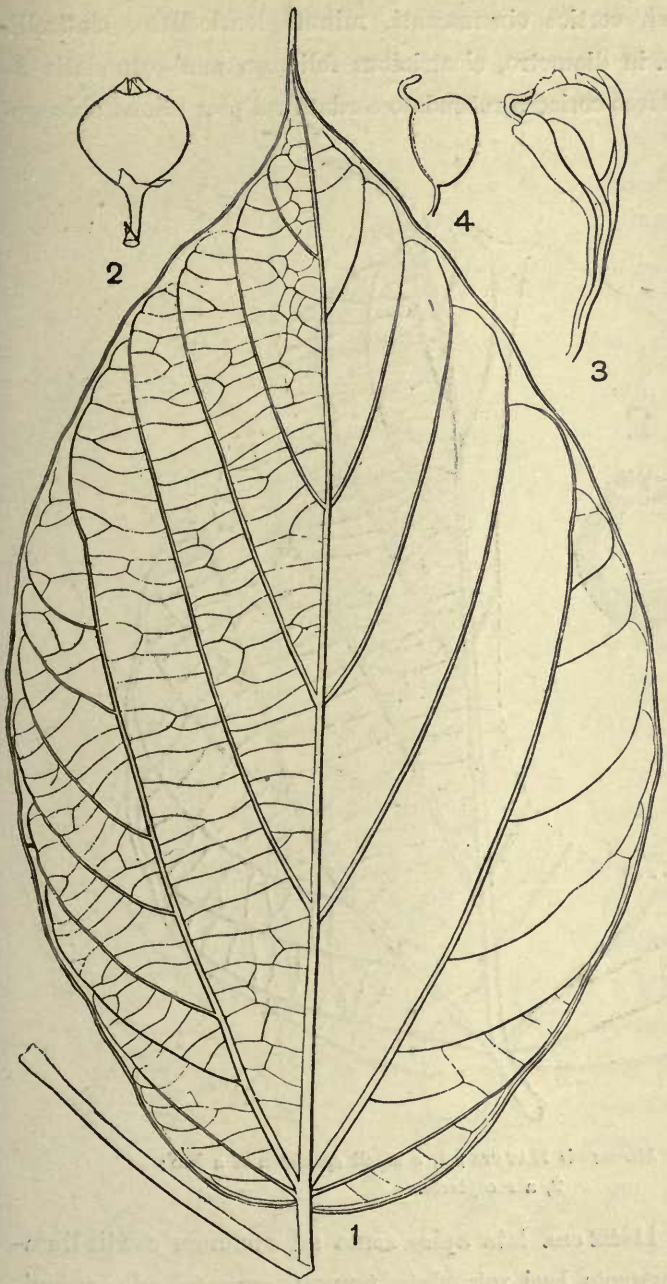

Fig. 49, *Ficus antaœnsis* HAYATA; 1, a leaf ×⅔; 2, a receptacle ×⅔; 3, a female flower; 4, an ovary.

vel 7-nervia, nervis a se angulo 30° egressis, nervis lateralibus extrorsum 4-veniferis, costa utroque latere 3–4 venifera, venis a costa angulo 30° egressis, petiolis 7–10 cm. longis teretibus, stipulis deciduis. Receptacula subglobosa 2 cm. in diametro, basi bracteis 3 dispositis triangularibus 4 mm. longis acutis depresso-hirsutis. Fl. ♀: perianthii segmenta 3–4 linearia vel spathulata 2–3 mm. longa. Achænia semi-oblonga semi-obovata 1½ mm. longa 1 mm. lata rugulosa.

HAB. Kōtōshō, leg. S. SASAKI, Juli. 1912.

Near *Ficus hiiranensis* HAYATA; but differs from it in having oblong leaves.

25. **Ficus hiiranensis** HAYATA, sp. nov. (Fig. 50). Arbor, cortice pallido-cinereaceo. Ramuli validius-

culi teretes 13 mm. crassi, cortice cinerascenti, minute lenticellato, lenticellis rotundatis elevatis 1 mm. in diametro, cicatricibus foliorum semi-rotundatis 6–7 mm. latis. Folia chartaceo-coriacea rotundato-cordata vel plus minus oblongo-

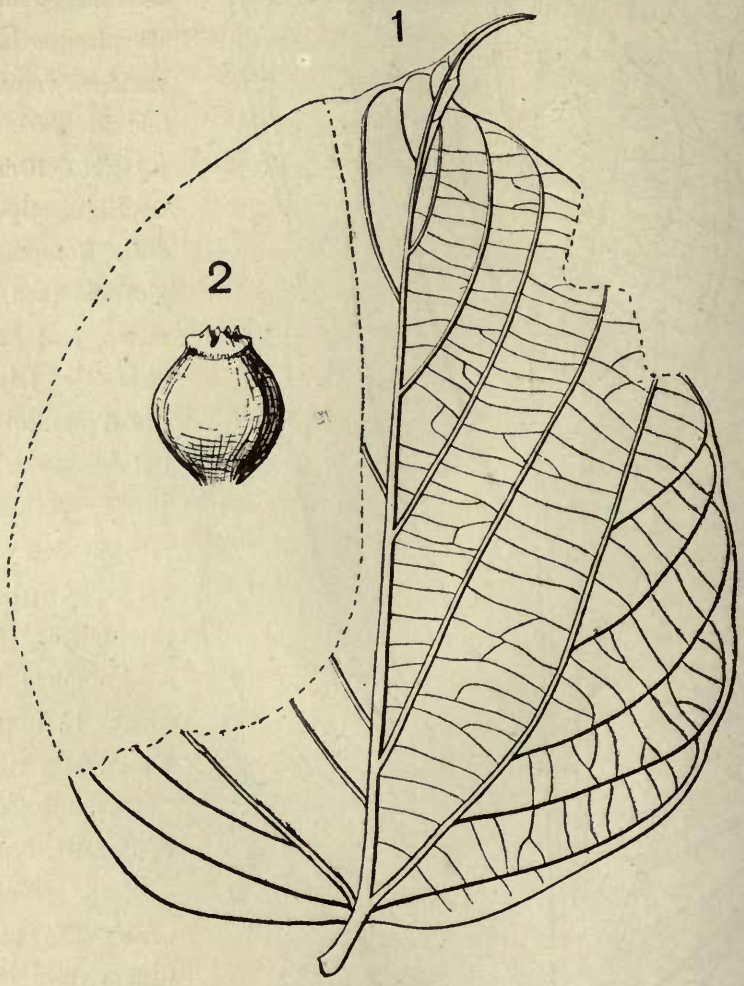

Fig. 30, *Ficus hiiranensis* HAYATA; 1, a small specimen of a leaf; 2, a receptacle.

cordata 16–30 cm. longa 11–22 cm. lata apice acuta ad summum caudis linearibus 5–15 mm. longis instructa basi rotundata truncato-cuneata ad extremitatem tenuiter cordata margine subintegra vel obscure plane undulata utraque pagine glabra, nervis venisque supra tenuiter impressis subtus elevatis, 5–7-

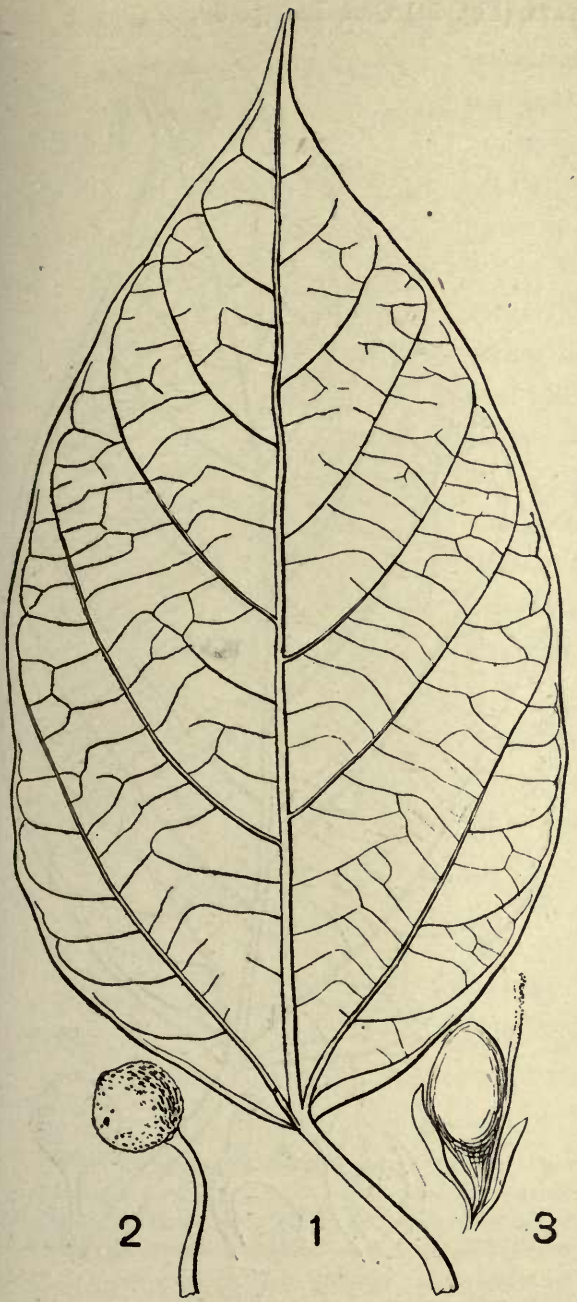

Fig. 31; *Ficus Konishii* HAYATA; 1, a leaf; 2, a receptacle; 3, a gall-flower.

nervia, nervis lateralibus a costa angulo 30°–40° egressis, petiolis teretibus 3–10 cm. longis glabris. Receptacula subglobosa extus glabra intus hirsuta. Fl. gall. breve pedicellati; perianthii segmenta 3 oblonga vel linearia; ovarium galliferum ovoideum 1 mm. longum.

Ficus Roxburghii HEMSL. Ind. Fl. Sin. II. p. 467; MATSUM. et HAYATA Enum. Pl. Formos. p. 380 (non WALL.).

HAB. Hiiranzan, leg. B. HAYATA et S. SASAKI, Juni. 1912.

This is perhaps the same species recorded from Formosa as *Ficus Roxburghii* WALL. by HEMSLEY in his "Ind. Fl. Sin." II. p. 467.

The new species differs from *F. Roxburghii* WALL. in the far much smaller receptacles. I infer that HEMSLEY must have identified his Formosan species to *F. Roxburghii* without examining receptacles. So far, we have never seen the latter in the island.

26. **Ficus Konishii** HAYATA (Fig. 51) Gen. Ind. p. 69.

27. **Ficus glochidiifolia** HAYATA sp. nov. (Fig. 52). Arbor. Folia ovata vel ovato-rhomboidea 13 cm. longa 6–9 cm. lata apice triangulari-acuta ad summum breve caudata basi truncata obtusa vel late acuta chartaceo-coriacea vel chartacea margine integra utraque pagine glabra, costis venis supra planis haud elevatis subtus distincte elevatis, subtrinervia, nervis lateralibus a costa angulo 40° egressis, petiolis 3–4 cm. longis teretibus glabris. Receptaculum subglobosum 1–1½ cm. in diametro. Fl. gall.: perianthii segmenta 3–5 linearia 1 mm. longa.

HAB. Hiiranzan, leg. S. SASAKI.

28. **Ficus kotœnsis** HAYATA sp. nov. (Fig. 53). Arbor. Ramuli fere graciles fulvescentes plus minus hirsuti. Folia plus minus obliqua chartacea oblonga oblongo-ovata 9–12 cm. longa 5½–6 cm. lata apice acuta ad summum brevissime caudata

Fig. 52, *Ficus glochidiifolia* HAYATA; 1, a leaf; 2, a receptacle; 3, a female flower; 4, an ovary.

basi oblique rotundata vel cordata vel uno latere acuta uno latere rotundata margine subintegra supra glabra subtus ad costas venasque hirsuta basi subtrinervia vel pinnivena, costis venis supra planis vel vix impressis subtus elevatis, venis lateralibus primariis utroque latere costæ 5–6 arcuatis, petiolis 1–1½ cm. longis fulvo-hirsutis subteretibus. Receptacula subglobosa 1½ cm. in diametro, basi bracteis 3 dispositis obtuso-triangularibus margine plus minus ciliolatis. Fl. ♀ : pedicellis ⅔–1 mm. longis glabris, perianthia haud lobata globoso-tubulosa vel campanulata membranacea hyalina ad oria integra ⅓–⅔ mm. longa. Ovarium oblique globosum ½ mm. longum, stylo oblique sito apice hirsuto 1–1¼ mm. longo. Achænium oblique obovoideum 1 mm. longum basi plus minus stipitatum.

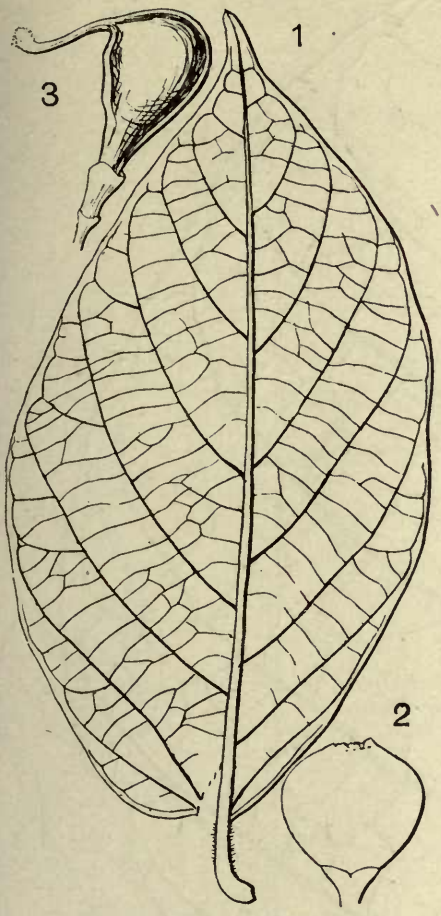

Fig. 53, *Ficus kotœnsis* Hayata; 1, a leaf; 2, a receptacle; 3, a female flower.

Hab. Kōtōshō, leg. S. Sasaki.

29. **Ficus kaukauensis** Hayata (Fig. 54) Ic. Pl. Formos. VII. p. 35.

30. **Ficus ochobiensis** Hayata (Fig. 55) Ic. Pl. Formos. VII. p. 36.

Ficus Katsumadai Hayata sp. nov. (Fig. 56). Frutex; rami graciles teretes fusco-rubescentes longitudinaliter rugulosi. Folia membranacea vel chartacea oblongo-lanceolata 14 cm. longa 5 cm. lata apice acuminata vel acuminatissima basi ad extremitatem tenuiter cordata margine subintegra vel versus basin tenuiter dentata supra scaberrima subtus scabra basi 3-nervia, petiolis 1½–4 cm. longis. Receptaculum axillare solitarium subglobosum 1 cm. in diametro extus patento-hirsutum intus dense hirsutum. Fl. gall. plus minus pedicellati, perianthii segmenta 3–4 linearia 1 ½mm. longa apice acuminata. Ovarium galliferum subglobosum minus quam 1 mm. in diametro.

Hab. Hainan, leg. Z. Katsumada.

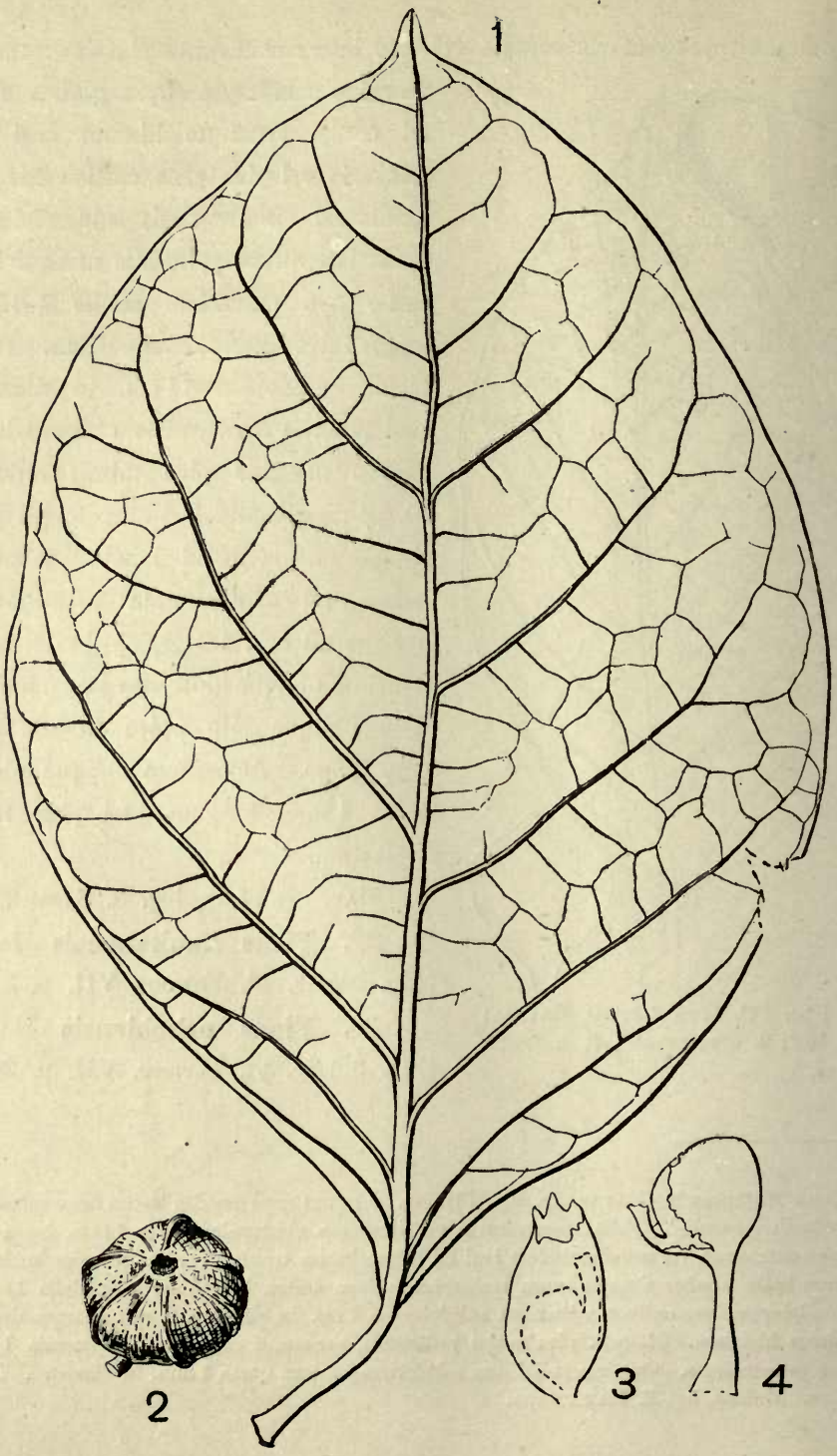

Fig. 54, *Ficus kaukauensis* HAYATA; 1, a leaf; 2, a receptacle; 3, a young gall-flower; 4, a mature gall-flower.

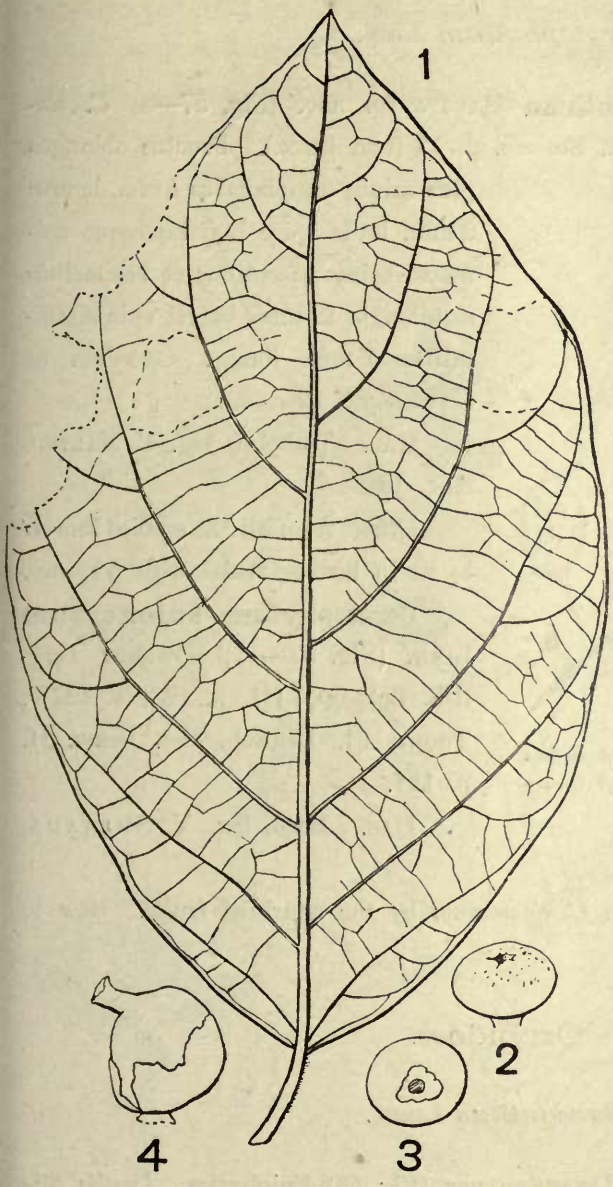

Fig. 55, *Ficus ochobiensis* HAYATA; 1, a leaf; 2, 3, a young receptacle, seen from different sides; 4, a female flower.

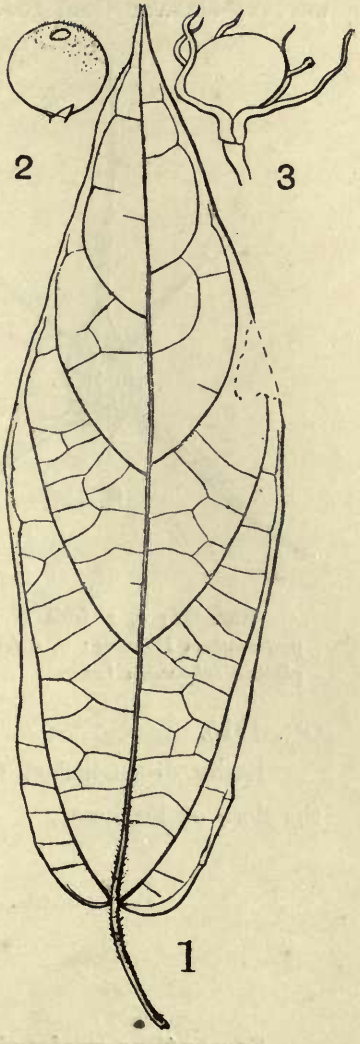

Fig. 56, *Ficus Katsumadai* HAYATA; 1, a leaf; 2, a receptacle; 3, a gall-flower.

Ceratophylleæ.

Ceratophyllum Linn.

Ceratophyllum pentacanthum Hayata sp. nov. (Fig. 57—a) *C. demersum* Hayata Gen. Ind. Fl. Formos. p. 73 (non Linn.). Fructus oblongus plus minus complanatus 4 mm. longus 2 mm. latus apice basi latereque spinosus, spinis apicalibus et basilaribus æquilongis 12 mm. longis, spinis lateralibus 7 mm. longis. Cæterum ut *Ceratophylli demersi*.

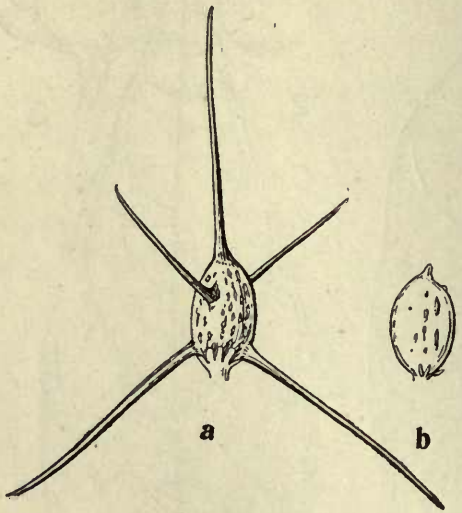

Fig. 57; a, a fruit of *Ceratophyllum pentacanthum* Hayata; b, a fruit of *Ceratophyllum submersum* Linn.

Hab. Taihoku, leg. T. Makino, Nov. 1896.

Differs from all the species known to us in having fruits with 5 spines.

Ceratophyllum submersum Linn. (Fig. 57—b); Sowerby English Botany VIII. p. 124, t. 1277; Thome Fl. Deutsch. Ost. Schw. II. p. 121.

Hab. Matō, leg. Y. Shimada, Oct. 1915.

Easily distinguished from *C. demersum* by the unarmed fruits. New to the flora of Formosa.

Orchideæ.

Sarcanthus Lindl.

Sarcanthus uraiensis Hayata sp. nov. (Fig. 58) Epiphytica. Caulis 30–40 cm. longus glaber teres suberectus flexuosus. Folia alterna linearia 20 cm. longa 2 cm. lata apice obtusa ad summum inæqualiter 2-lobata, lobo altro

subnullo, altro 1–2 mm. longo, crassiuscula basi plus minus contracta margine integra sessilia glabra. Racemi oppositifolii 12 cm. longi pauce ramosi, bracteis minutis, pedicellis (vel ovariis) 2 mm. longis. Sepalum posticum late oblongum 4 mm. longum 3 mm. latum apice obtusissimum, lateralia oblongo-linearia 4 mm. longa 2 mm. lata apice obtusissima. Petala oblique oblonga $2\frac{1}{2}$ mm. longa

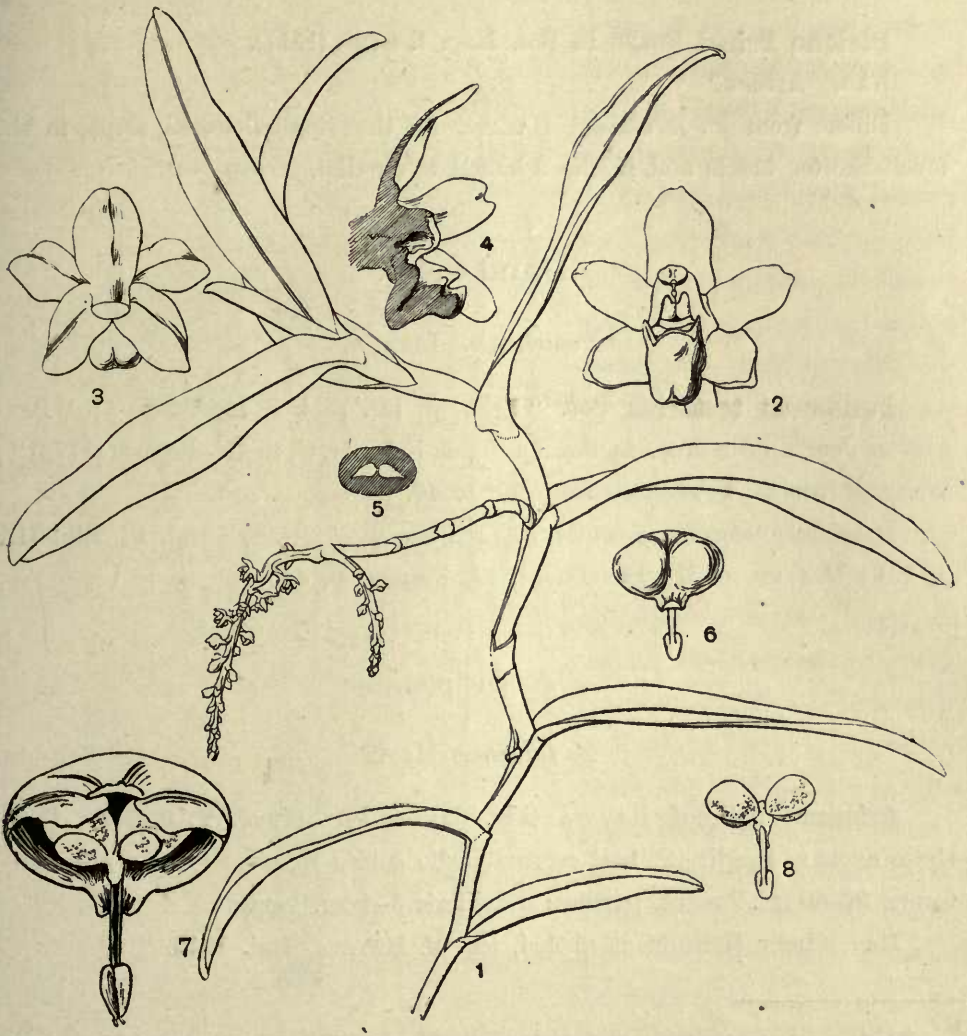

Fig. 58, *Sarcanthus uraiensis* HAYATA; 1, the plant $\times\frac{1}{2}$; 2, a flower; 3, the same flower, seen from back; 4, the same, in vertical section; 5, cross section of the basal sac of the labellum; 6, an anther; 7, the same, seen from back; 8, pollinia.

$1\frac{1}{2}$ mm. lata apice obtusissima. Labellum 3-lobatum, lobis lateralibus minutis oblique triangularibus 1 mm. longis $1\frac{1}{2}$ mm. latis acutis, lobo terminali brevissimo valde incrassato rotundato 1 mm. in diametro. Columna 1 mm. longa.

HAB. Urai, leg. B. HAYATA.

Pleione DON.

Pleione Pricei ROLFE in Bot. Mag. t. 8729 (1917).

HAB. Arisan ?

Differs from *P. formosana* HAYATA in the single-flowered scape, in the much shorter bracts and in the 2-lamellate lip-disc.

Pandaneæ.

Pandanus LINN. f.

Pandanus tectorius SOL. "Prim. fl. ins. paci. f. ined. 350"; "PARKINSON Journ. of a Voy. to the South Sea in H. M. S. the Endeavour (1773)"; WARB. Pfl.-reich. IV.—9, Pandanaceæ p. 46.

Pandanus odoratissimus LINN. f.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 171; MATSUM. et HAYATA Enum. Pl. Formos. p. 455.

Aroideæ.

Arisaema MART.

Arisæma Takeoi HAYATA (Fig. 59) Ic. Pl. Formos. V. p. 246. Descriptio aucta: Spadix ♀ basi erectus medio subito recurvus reflexus apice filiformis 30–40 cm. longus, partibus ovariiferis 3–4 cm. longis.

HAB. Inter Heirinbi et Shōkei, leg. B. HAYATA, Mai. 1916.

Pandanus tectorius SOL. var. β. **liukiuensis** WARB. "Folia minora angusta flabello longo terminata, spinis marginalibus quam in typo majoribus armata. Phalanges minores pauci—(5–6) loculares. Foliis basi tantum et breviter spinulosis."

"Liukiu auf Miyakeshima und Ischigaki z. B. dichte Strandgebüsche bildend (WARBURG)."

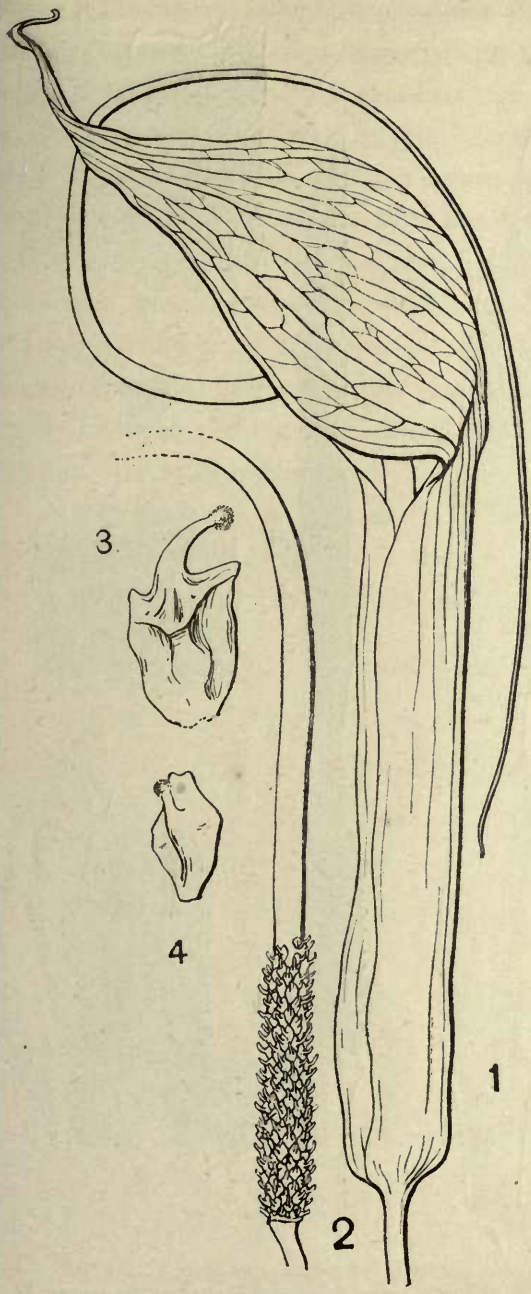

Fig. 59, *Arisæma Takeoi* HAYATA; 1, a spatha with spadix; 2, basal portion of a spadix; 3, ovary; 4, the same, seen from above.

Colocasia SCHOTT.

Colocasia formosana HAYATA sp. nov. (Fig. 60). Rhizoma suberectum crassum 10 cm. longum 3 cm. crassum radices teretes 2 mm. crassas multo gerens. Folia ad apicem rhizomatis 3–4 insita longe petiolata, petiolis erectis 50–60 cm. longis glabris pallido-viridibus, laminis ovatis 30–40 cm. longis 20–25 cm. latis apice triangulari-acutis basi cordatis peltatis, sinibus cordis 5 cm. profundis, membranaceis. Scapi erecti recti, pedunculis 20–30 cm. longis. Spatha 15–20 cm. longa convoluta, in convoluto 1 cm. lata, apice acuminata loco a basi ad 5 cm. altitudinem leviter constricta. Spadix 13–15 cm. longus, parte infeirore ovariifera 4–5 cm. longa cum ovariis 7 mm. lata; ovarium cum staminodiis intermixtum latere compressum globoso-conicum, stigmate peltato sessili rotundato 4-lobato vel elobato; parte ovariifera apice gradatim ad partem neutralem abeunti; parte neutrali 1 cm. longa 2 mm. lata apice grandatim ad partem staminiferam abeunti;

parte staminifera 3 cm. longa cum staminibus 5 mm. lata; staminibus dense dispositis; stamina generaliter 4-connata synandrium formantia; synandrium late stipitatum, stipitibus $\frac{1}{2}$ mm. longis 1 mm. latis valde complanatis, late cylindricum $1\frac{1}{2}$ mm. latum 1 mm. longum apice perfecte truncatum; parte staminifera apice abrupte appendice terminata; appendix cylindrica 3 cm. longa 3 mm. lata apice obtusa basi contracta rugulosa.

Hab. Urai, leg. B. Hayata et T. Sōma, Mai. 1916.

Near *C. antiquorum*, but differs from it in the existence of neutral ovaries between fertile ones. This is not eaten by any native of the island.

Colocasia Konishii Hayata sp. nov. Folia longe petiolata, petiolis 50 cm. longis plus

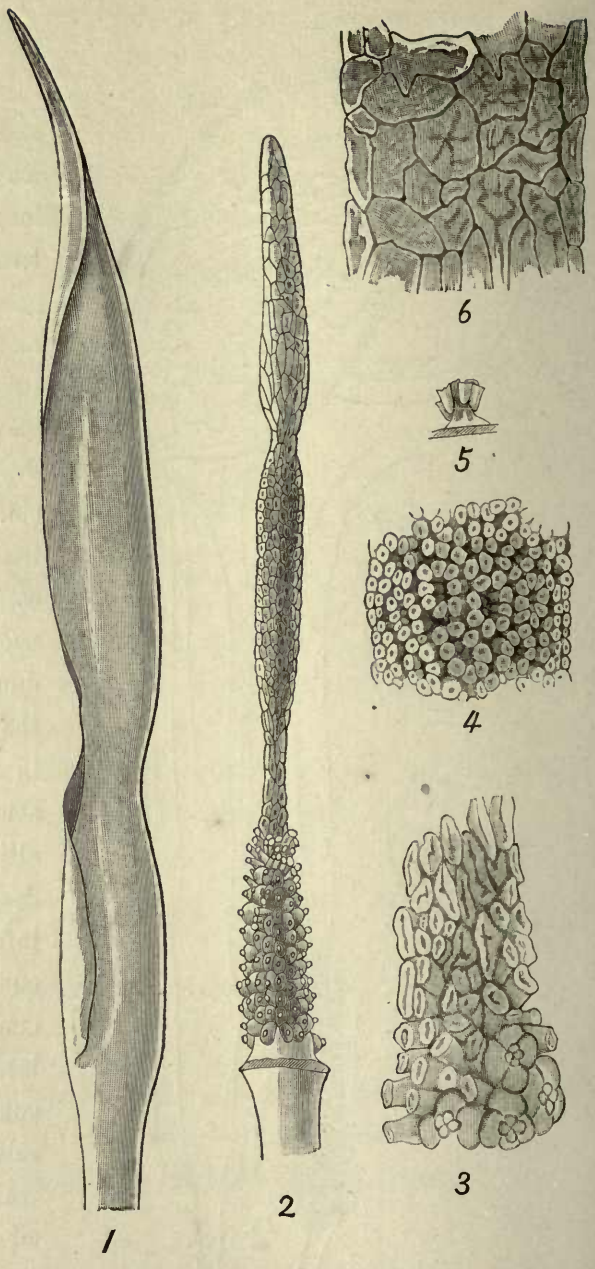

Fig. 60, *Colocasia formosana* Hayata; 1, a spatha; 2, a spadix; 3, an apical portion of the ovariiferous part; 4, a portion of the staminiferous part; 5, a synandrium; 6, a portion of the appendage.

minus rubescentibus; lamina ovata peltata 25 cm. longa 18 cm. lata membranacea margine integra apice rotundata apiculata basi peltata cordata. Scapus 30 cm. —40 cm. longus; spatha 18–20 cm. longa convoluta loco a basi ad 5 cm. altitudinem plus minus constricta. Spadix 12 cm. longus, parte inferiore ovariifera, superiore staminifera, ad summum appendice cylindrica acuta $2\frac{1}{2}$ cm. longa 5 mm. lata minute botryoideo-rugulosa terminatus; parte ovariifera 2–3 cm. longa cylindrica cum ovariis 4–5 mm. lata, (ovariis dense dispositis depressis latere compressis, stigmatibus peltatis rotundatis complanatis), apice angustata demum dilatata ad partem staminiferam abeuns; parte staminifera cylindrica 3–4 cm. longa; synandriis 6–8-antheriferis cuneato-cylindricis $1\frac{1}{3}$ mm. longis sessilibus 1 mm. latis apice perfecte truncatis 6–8-poriferis; parte staminifera 3–4 cm. longa 7–8 mm. lata apice contracta.

Hab. Urai, leg. S. Konishi.

Differs from *C. formosana* in the absence of staminodes between the ovaries, and in the very minutely botryoidally rugose appendages.

Homalomena Schott.

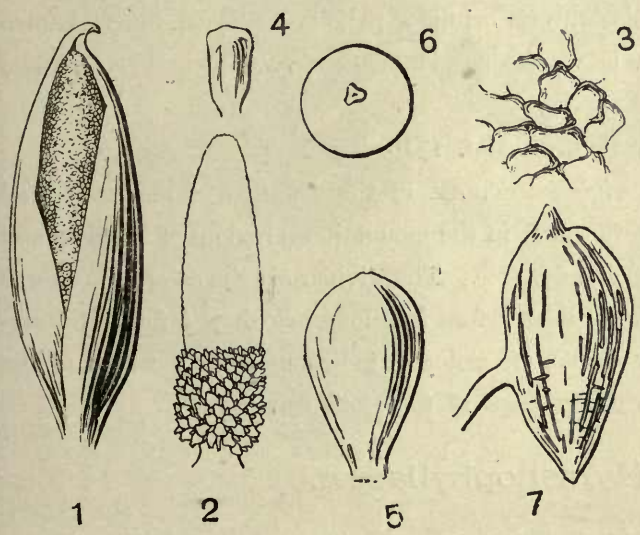

Fig. 61, *Homalomena kelungensis* Hayata; 1, a spadix in a spatha; 2, the same spadix; 3, a part of the staminiferous portion; 4, a stamen; 5, an ovary; 6, the same, seen from above; 7, an ovule.

Homalomena kelungensis Hayata sp. nov. Rhizoma suberectum? Folia ad apicem rhizomatis 4–5 equitantim disposita; petiolis 60 cm. longis basi dilatatis basin foliorum altrorum amplectantibus; lamina late ovata 33 cm. longa 25 cm. lata apice triangulari-acuta basi sagittato-cordata margine integerrima membranacea, venis nervisque fere parallelis.

Spadix longe pedunculatus cum pedunculo 40 cm. longus apice pedunculi nutans. Spatha 6 cm. longa apice acuta margine valde imbricata. Spadix erectus cylindricus 4–5 cm. longus 12 mm. latus apice obtusus haud appendiculatus; parte ovariifera inferiora 12 mm. longa 12 mm. lata; parte staminifera superiora 3 cm. longa 13 mm. lata apice obtusissima; ovarium cum staminodiis intermixtum obovoideum sessile 2–2½ mm. longum apice obtusum stigmatiferum; staminodiis clavatis 2 mm. longis; stamina distincta dense disposita sessilia complanata 1½ mm. longa 1 mm. lata apice truncata, anthera 2-locularis.

Hab. Kelung, Senton, leg. B. Hayata, Mart. 1916; S. Fujii, 1917.

Near *H. rubescens* (Wight Ic. t. 807; Engler Pfl.-fam. II.—3, p. 131, fig. 84), but differs from it in the pale green spathe.

Remusatia Schott.

In Engler Natürl. Pfl.-fam. II.—3, p. 139.

Remusatia formosana Hayata sp. nov. Epiphytica; tuber depresso-globosum supra stolones radiatim emittens basi radiciferum; stolones 20–60 cm. longi versus apicem corpora aggregata gerentes 5–6-radiatim ex apicem tuberis oriundi. Folia 2–3 ex apice tuberis oriunda, petiolis 30–44 cm. longis, lamina ovata 20 cm. longa 13 cm. lata apice cuspidato-acuta basi peltata et cordata margine integerrima.

Hab. Keitao, leg. B. Hayata, Mai. 1916.

Resembles *Remusatia vivipara* Schott. in the venation of the leaves and in the viviparous shoots. It grows in the mountainous regions of Formosa and was found on the trunk of a large tree. The viviparous shoots were collected and sent to me several times, long before its mother-stock was found by myself. It has very peculiar shoots, (or stolones) radiating from the apex of the mother stock before the ordinary shoot of the stock comes out.

Hymenophyllaceæ.

Hymenophyllum Linn.

Hymenophyllum constrictum Hayata Gen. Ind. p. 100.

Hymenophyllum punctisorum Rosenst. Hedwigia Band 56, p. 333.

in monte Arisan, ad arborum ramos, V. 1914, leg. U. FAURIE, No. 302.

Polypodiaceæ.

Aspidium SWARTZ.

Aspidium kwanonense HAYATA sp. nov. (Fig. 61–62). Rhizoma suberectum. Stipes 20–25 cm. longus rubro-purpureus nitidus basi dense squamatus,

Fig. 61, *Aspidium kwanonense* HAYATA ×$\frac{1}{3}$

Spadix longe pedunculatus cum pedunculo 40 cm. longus apice pedunculi nutans. Spatha 6 cm. longa apice acuta margine valde imbricata. Spadix erectus cylindricus 4–5 cm. longus 12 mm. latus apice obtusus haud appendiculatus; parte ovariifera inferiora 12 mm. longa 12 mm. lata; parte staminifera superiora 3 cm. longa 13 mm. lata apice obtusissima; ovarium cum staminodiis intermixtum obovoideum sessile 2–2½ mm. longum apice obtusum stigmatiferum; staminodiis clavatis 2 mm. longis; stamina distincta dense disposita sessilia complanata 1½ mm. longa 1 mm. lata apice truncata, anthera 2-locularis.

Hab. Kelung, Senton, leg. B. Hayata, Mart. 1916; S. Fujii, 1917.

Near *H. rubescens* (Wight Ic. t. 807; Engler Pfl.-fam. II.—3, p. 131, fig. 84), but differs from it in the pale green spathe.

Remusatia Schott.

In Engler Natürl. Pfl.-fam. II.—3, p. 139.

Remusatia formosana Hayata sp. nov. Epiphytica; tuber depresso-globosum supra stolones radiatim emittens basi radiciferum; stolones 20–60 cm. longi versus apicem corpora aggregata gerentes 5–6-radiatim ex apicem tuberis oriundi. Folia 2–3 ex apice tuberis oriunda, petiolis 30–44 cm. longis, lamina ovata 20 cm. longa 13 cm. lata apice cuspidato-acuta basi peltata et cordata margine integerrima.

Hab. Keitao, leg. B. Hayata, Mai. 1916.

Resembles *Remusatia vivipara* Schott. in the venation of the leaves and in the viviparous shoots. It grows in the mountainous regions of Formosa and was found on the trunk of a large tree. The viviparous shoots were collected and sent to me several times, long before its mother-stock was found by myself. It has very peculiar shoots, (or stolones) radiating from the apex of the mother stock before the ordinary shoot of the stock comes out.

Hymenophyllaceæ.

Hymenophyllum Linn.

Hymenophyllum constrictum Hayata Gen. Ind. p. 100.

Hymenophyllum punctisorum Rosenst. Hedwigia Band 56, p. 333.

in monte Arisan, ad arborum ramos, V. 1914, leg. U. FAURIE, No. 302.

Polypodiaceæ.

Aspidium SWARTZ.

Aspidium kwanonense HAYATA sp. nov. (Fig. 61–62). Rhizoma suberectum. Stipes 20–25 cm. longus rubro-purpureus nitidus basi dense squamatus,

Fig. 61, *Aspidium kwanonense* HAYATA ×$\frac{1}{3}$

Fig. 64, *Aspidium nantœnse* Hayata.

20–25 cm. lata, pinnis lateralibus utroque latere 2–4 plus minus falcatis, infimis latere inferiore pinnula una instructis; pinnis mediis lanceolatis 18 cm. longis 5 cm. latis apice acuminatis, (acuminibus linearibus), basi oblique obtusissimis sessilibus vel petiolulatis margine crenato-undulatis; textura membranaceo-chartacea; pinnis a se 7–8 cm. remotis; pagine supra glabra subtus subglabra. Sori ad totam paginam dispersi subrotundati 1 mm. in diametro.

Polypodium Barberi Matsum. et Hayata Enum. Pl. Formos. p. 628 (non Hook.)

Aspidium Barberi Hayata (non C. Ch.) in Gener. Ind. Fl. Formos. p. 102.

Hab. Kwanon-cataracta (Nantō), Mart. 1915, leg. S. Fujii (typus); Kwarenkō; leg. K. Miyake.

This was first identified with *Polypodium Barberi* Hook. It is, however, clear that the present fern is distinct from *P. Barberi* in having much broader pinnæ.

Aspidium pachinense Hayata sp. nov. (Fig. 65–66). Rhizoma erecto-repens cum reliquis stipitis $2\frac{1}{2}$ cm. latum. Stipes 30–70 cm. longus minute hirsutus atro-purpureus nitidus sulcatus basi dilatatus basi dense squamatus, (squamis linearibus acuminatissimis fusco-rubescentibus 1 mm. latis 7 mm. longis). Frons in ambitu triangularis

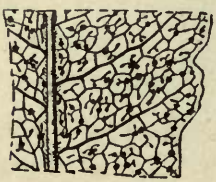

Fig. 66, *Aspidium pachinense* Hayata.

Fig. 65, *Aspidium pachinense* Hayata ×$\frac{1}{8}$

30–40 cm. longa 35–45 cm. lata basi bipinnata, pinnis utroque latere rhachis frondis 2–3, infimis pinnatis, superioribus simplicibus; pinnis superioribus simplicibus oblanceolatis plus minus falcatis 16 cm. longis 4 cm. latis apice acuminatis basi rotundatis sessilibus margine crenulato-serratis; pinna terminalis basi pinnatifida vel -secta; pinnis infimis pinnatis late triangularibus 25 cm. longis 15 cm. latis, pinnulis utroque latere 1 petiolatis, petiolis 1–2 cm. longis; textura membranacea; pagine supra glabra subtus minute hirsuta. Sori tota pagine dispersi rotundati distincti vel interdum confluentes ½ mm. in diametro.

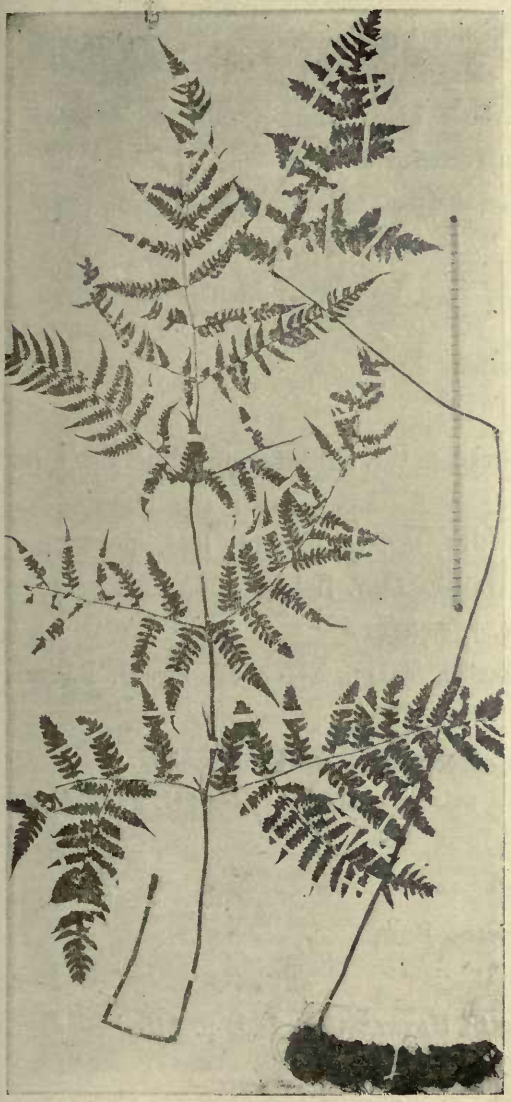

Fig. 67, *Aspidium rufinerve* Hayata ×½

Hab. Pachina.

Near *A. Barberi* and *A. melanocaulon;* but differs from the former by the pinnate lower-most pinnæ and by the less acuminate pinnules; and from the latter by the less lobed pinnules. Also differs from *A. kwarenkœnse* Hay., by the minutely hirsute fronds.

Aspidium phæocaulon Rosenst. l. c. p. 345.

Hab. Urai, 300 m. alt., IV. 1914, Faurie, n. 33.

Aspidium rufinerve Hayata (Fig. 67–68). Gen. Ind. p. 102. Rhizoma crassum horizontaliter situm cum reliquis stipitis 4 cm. crassum subrectum dense frondigerum versus apicem dense squamatum. Stipes 90–100 cm. longus nitidus fulvo-rubescens basi pauce squamatus. Frons in ambitu late triangularis 80–90 cm. longa 100

cm. lata apice cuspidato-acuta basi cordata basi tripinnata, pinnis infimis longissimis 50 cm. longis 30 cm. latis oblique triangularibus apice acuminatis bipinnatis, pinnulis infimis lateris inferioris longissimis lanceolatis 30 cm. longis 10 cm. latis acuminatis basi truncatis pinnatis, pinnulis II. linearibus 6 cm. longis $1\frac{1}{2}$ cm. latis apice acuminatissimis basi truncatis subsessilibus vel brevissime petiolulatis margine regulariter lobulatis, lobulis oblongis plus minus ascendentibus 5 mm. longis 3–4 mm. latis apice rotundatis; textura membranacea plus minus crassiuscula; pinnis inferioribus a se 17 cm., pinnulis I. a se 4 cm., pinnulis II. a se 2 cm., remotis.

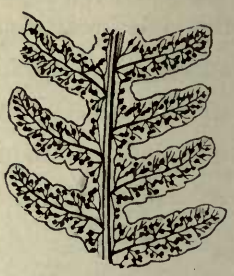

Fig. 68, *Aspidium rufinerve* Hayata.

Hab. Uraisha, leg. T. Sōma et B. Hayata, 1916.

Asplenium Linn.

Asplenium pseudofalcatum Hillebr. var. **subintegrum** Rosenst. form. **obtusum** l. c. p. 334.

Hab. Bunkiko 1500 m. alt., V. 1914, leg. U. Faurie; ibid. no. 455.

Asplenium unilaterale Lam.; Hayata Gen. Ind. p. 103.

Asplenium cataractarum Rosenst. l. c. 334.

Hab. in monte Tamsui, ad cataractas, 500 m., XII. 1913, leg. U. Faurie, no. 151.

Asplenium Wilfordi Mett. var. **densum** Rosenst. l. c. 334.

Hab. ad radices montis Raisha, in petrosis, III. 1914, leg. U. Faurie, no. 142.

Athyrium Roth.

Athyrium tenuissimum Kodama; Hayata Gen. Ind. p. 110.

Nephrolepis tenuissima Hayata Gen. Ind. p. 110.

Athyrium obtusifolium Rosenst. l. c. p. 335.

HAB. in latebris montis Arisan, 2500 m. alt., V. 1914, U. FAURIE, no. 364; ibid, in cavernis rupium, no. 360.

Cyclophorus DESV.

Cyclophorus lingua DESV. var. **angustifrons** HAYATA Gen. Ind. p. 104.

Cyclophorus lingua (THBG.) var. *attenuata* ROSENST. l. c.

HAB. Raisha, ad rupes, III. 1914, leg. U. FAURIE, n. 223.

Diplazium SW.

Diplazium Hankockii (MAXIM.) HAYATA Gen. Ind. p. 105.

Diplazium crenato-serratum (BL.) MOORE var. *hirtum* ROSENST. n. v. l. c. p. 336.

HAB. Urai, in silvis 1000 m. alt. IV. 1914, U. FAURIE, no. 168.

Diplazium kappanense HAYATA sp. nov. (Fig. 69–70). Rhizoma ? Stipes 30–40 cm. longus fulvo-stramineus haud nitidus basi densissime squamatus, (squamis nigerrimis lineari-lanceolatis 10–15 mm. longis 1–2 mm. latis apice acuminatis fere filiformibus ad paginam marginemque hirsutis). Frons in ambitu late triangularis 40 cm. longa 50 cm. lata apice cuspidato-acuminata bipinnata, pinnis infimis longissimis 25 cm. longis 15 cm. latis lanceolatis apice acuminatis basi truncatis, pinnulis lineari-lanceolatis 8 cm. longis 22 mm. latis apice acuminatis basi truncatis subsessilibus margine lobulatis, lobulis denticulatis apice rotundato-truncatis 5 mm. longis totiusque latis; pinnis inferioribus a se 8 cm., pinnulis inferioribus a se 2 cm., remotis; petiolis pinnarum 3 cm. longis, petiolis pinnularum 2 mm. longis; textura herbacea plus minus crassiuscula utraque pagine glabra. Sori lineares 1–1½ mm. longi; indusium lunulatum.

HAB. Kappanzan, leg. U. FAURIE.

Near *Diplazium Dœderleinii;* but distinguishable from it in having black scales.

Fig. 69, *Diplazium kappanense* HAYATA ×¼

Fig. 70, *Diplazium kappanense* HAYATA.

Diplazium Kawakamii HAYATA Gen. Ind. p. 106.

Athyrium allanticarpum ROSENST. l. c. 335.

HAB. Bunkikiyo, 1500 m. alt., V. 1914, leg. U. FAURIE no. 4 32.

Diplazium laxifrons ROSENST. l. c. p. 337.

HAB. Bankinsing, ad cataractas, 800 m. alt., rarissime; II. 1914, leg. U. FAURIE, no. 172.

Diplazium maximum (DON.) var. **formosanum** ROSENST. l. c. p. 337.

HAB. in montibus Shinten, I. 1914, U. FAURIE, n. 170.—Urai, in silvis, 800 m. alt., IV. 1914, U. FAURIE, n. 178.

Fig. 71, *Diplazium pseudo-Dœderleinii* HAYATA $\times\frac{1}{15}$

Diplazium odoratissimum HAYATA Gen. Ind. p. 106.

Diplazium formosanum ROSENST. l. c. p. 338.

HAB. Urai, in humidis silvarum, 800 m. alt., IV. 1914, U. FAURIE, no. 188.

Diplazium pseudo-Dœderleinii HAYATA sp. nov. (Fig. 71–72). Stipes 93 cm. longus pallido-stramineus subnitidus basi plus minus rugosus basi dense squamosus, squamis fulvis longissime linearibus 1–2 cm. longis $\frac{1}{5}$–1 mm. latis acuminatissimis basi laceratis vel integris. Frons late triangularis 169 cm. longa 138 cm. lata apice triangulari-acuminata basi in ambitu sagittato-truncata bipinnata, pinna infima longissima 73 cm. longa lanceolata 20–30 cm. lata apice

Fig. 72, *Diplazium pseudo-Dœderleinii* HAYATA.

acuminata basi obtusa, pinnulis lineari-lanceolatis 15 cm. longis 4 cm. latis pinnatifidis, segmentis late linearibus 2 cm. longis 7 mm. latis obtusissimis basi dilatatis serrulatis, serrulis obtusis; pinnis a se 15 cm., pinnulis a se 3–4 cm., segmentis a se 3–4 mm., remotis; textura herbacea; utraque pagine glabra. Sori prope costulam dispositi lineares 3 mm. longi.

Hab. Ushōkō, leg. B. Hayata, Aprili. 1916, typus!; Arisan, 1912.

Near *D. Dœderleinii*, but differs from it in the far much larger fronds.

Diplazium uraiense Rosenst. l. c. 336.

Hab. Urai, in silvis 500 m. alt., IV. 1914, U. Faurie no. 185.

Dryopteris Adans.

Dryopteris adaucta Rosenst. l. c. 341.

Hab. Kelung, secus rivulos, 50 m. alt., III. 1914, Faurie n. 40.

Dryopteris aridum Bak.

The species is confounded with *D. sophoroides* among Formosan specimens. It is separated from *D. sophoroides* in having a series of auriculiformed pinnæ towards the base of the fronds.

Dryopteris atrosetosa Rosenst. l. c. p. 342.

Hab. Arisan, 2500 m. alt., V. 1914, U. Faurie, n. 382.

Dryopteris aureo-vestita Rosenst. l. c. p. 343.

Hab. Arisan, 2500 m. alt., V. 1914, U. Faurie, n. 390.

Dryopteris bankinsinensis Hayata sp. nov. (Fig. 73–74). Stipes 40–50 cm. longus minute hirsutus sparse squamatus, squamis tenuissimis ovatis vel lanceolatis 4½ mm. longis 2–1½ mm. latis apice cuspidato-acuminatis integris, cellulis linearibus stramineis. Frons bipinnata in ambitu ovato-triangularis 40 cm. longa 30 cm. lata apice acuminata basi truncato-obtusa, pinnis a se 8 cm. remotis inferioribus longioribus 20 cm. longis 7 cm. latis apice acuminatis basi truncatis pinnatis, pinnulis sessilibus a se 1½ cm. longis oblongo-linearibus 4 cm. longis 1½ cm. latis margine lobulatis, lobulis truncatis; textura membranacea herbacea. Sori lineares 1–2 mm. longi. Indusium nullum.

Hab. Bankinsin, leg. U. Faurie (No. 183).

Near *D. decurrenti-alata* Hook.; but differs from it by the much thinner fronds with more obtuse lobes and pinnules.

Dryopteris erythrosora (EAT.) var. **tenuipes** ROSENST. l. c. p. 341.

HAB. Mai, 800 m. IV. 1914, leg. U. FAURIE, no. 63.

Dryopteris fluvialis HAYATA Gen. Ind. p. 107.

Dryopteris athyriiformis ROSENST. l. c. p. 344.

HAB. Bankinsing, in silvis, 600 m. alt., II. 1914, leg.

Fig. 73, *Dryopteris bankinsinensis* HAYATA ×$\frac{1}{3}$

Fig. 74, *Dryopteris bankinsinense* HAYATA.

FAURIE, n. 189. Bunkikiyo, in humidis, 2000m. alt., V. 1914, leg. FAURIE, n. 386.

Fig. 76, *Dryopteris gymnopteridifrons* HAYATA.

Dryopteris gymnopteridifrons HAYATA sp. nov. (Fig. 75–76), Rhizoma ? Stipes circ. 30–40 cm. longus stramineus.

Fig.675, *Dryopteris gymnopteridifrons* HAYATA ×$\frac{1}{4}$

Frons in ambitu ovato-triangularis 40–50 cm. longa 40 cm. lata pinnata; pinnis omnibus subæqualibus conformibus utroque latere 3–4 ascendentibus vel patentibus lineari-lanceolatis 20–25 cm. longis 4–5 cm. latis apice acuminatissimis basi obtusis margine crenato-serratis utraque pagine minute hirsutis; textura membranaceo-chartacea. Sori inter venas pinnarum 2-seriatim in lineis parallelis a costa usque ad marginem dispositi rotundati 1 mm. in diametro.

Hab. Kusukusu, leg. T. Sōma, 1912.

Somewhat resembles *Nephrodium cuspidatum* Blume (Blume t. 45) and *Dryopteris urophylla* (Wall.) C. Ch., but differs from them in pinnæ which are in our species more obtuse or rather truncate at the base.

Dryopteris latipinna Hook.

Dryopteris sophoroides O. K. form. *ensiformis* Hayata Ic. Pl. Formos. VI. p. 180, fig. 118.

Dryopteris splendens (Hook.) var. **formosana** Rosenst. l. c. 343.

Hab. Arisan, 2500 m. alt., V. 1914, leg. U. Faurie, n. 381.

Dryopteris subhispidula Rosenst. l. c. p. 343.

Hab. Shakko, XII. 1913, leg. U. Faurie n. 12.

Dryopteris sublaxa Hayata Gen. Ind. p. 108.

Dryopteris arisanensis Rosenst. l. c. p. 340.

Hab. in monte Arisan, 2500 m. alt., V. 1914, U. Faurie, no. 389.

Dryopteris subtripinnata (Miq.) var. **bunkikiyensis** Rosenst. l. c. p. 342.

Hab. Bunkikiyo, 2000 m. alt., V. 1914, U. Faurie, n. 393.

Dryopteris succulentipes Hayata sp. nov. (Fig. 77–78). Stipes 30–40 cm. longus succulentus minute hirsutus basi squamatus, (squamis ovatis vel lanceolatis tenuissimis stramineis 5 mm. longis $1\frac{1}{2}$ mm. latis apice caudato—acuminatissimis integris. Frons ovato-lanceolata 40 cm. longa 20 cm. lata apice triangulari-acuminata basi obtusa pinnata, pinnis a se 8 cm. remotis, mediis longissimis linearibus 15 cm. longis 3 cm. latis apice acuminatis basi truncatis pinnati-sectis inferiore circ. ad rhachin sectis, segmentis linearibus 2 cm. longis 8 mm. latis apice obtuso-truncatis basi haud contractis margine

Fig. 77, *Dryopteris succulentipes* HAYATA $\times\frac{1}{3}$

Fig. 78, *Dryopteris succulentipes* HAYATA.

crenulato-serrulatis ; textura herbacea membranacea. Sori lineares 1 mm. longi. Indusium nullum.

HAB. Arisan, leg. U. FAURIE.

Near *D. decurrenti-alata* HOOK., but differs from it by the truncate segments of the pinnæ.

Dryopteris uraiensis ROSENST. l. c. p. 341.

HAB. Urai, 500 m. alt., IV. 1914, U. FAURIE, n. 22.

Elaphoglossum SCHOTT.

Elaphoglossum subellipticum ROSENST. l. c. p. 348.

HAB. Bunkikiyo, 1500 m. alt., V. 1914, leg. U. FAURIE, n. 488.

Leptochilus KAUL.

Leptochilus cuspidatus (PR.) var. **crenatus** ROSENST. l. c. p. 348.

HAB. Bankinsing, 800 m. alt., II. 1914, leg. U. FAURIE. n. 281.

Plagiogyria KUNZE.

Plagiogyria rankanensis HAYATA sp. nov. (Fig. 79–80). Rhizoma erectum plus minus ascendens. Stipes 13–14 cm. longus triangularis in sectione basi dilatatus subcomplanatus basi plus minus squamatus. Frons sterilis lineari-triangularis 30 cm. longa 18 cm. lata apice in ambitu cuspidata basi truncata pinnata, pinnis inferioribus

Fig. 79, *Plagiogyria rankanensis* HAYATA.

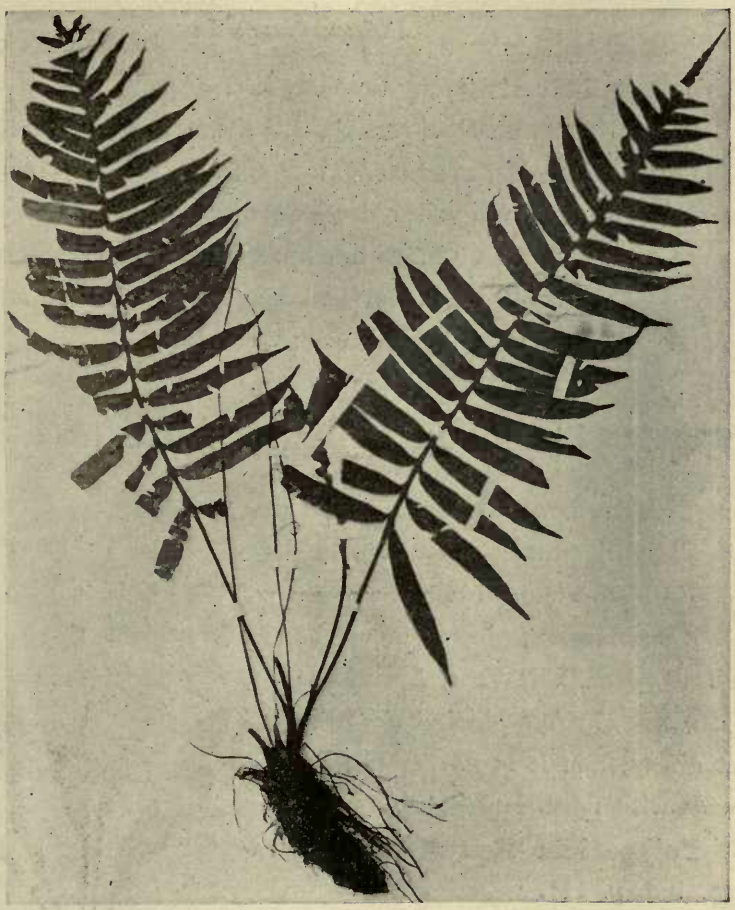

Fig. 80, *Plagiogyria rankanensis* HAYATA ×¼

longioribus, infimis plus minus reflexis, inferioribus horizontaliter patentibus lineari-lanceolatis 9 cm. longis 12 mm. latis apice acuminatis ad summum obtusis basi lateris inferioris valde contractis sed basi lateris superioris ad

rhachin frondis decurrentibus margine minute denticulatis sursum ad acuminem serrulatis; textura tenuiter chartacea, rhachis frondis complanata anguste alata. Frons fertilis 30–40 cm. longa remote pinnata, pinnis linearibus crispato-recurvatis 5–10 cm. longis 1 mm latis.

Hab. Rankanzan, ad 4900 ped. alt., leg. B. Hayata, Mai. 1916.

Near *P. adnata* Bedd., but separable from it by the distinctly winged rhachis and much smaller terminal pinna.

Polypodium Linn.

Polypodium diversum Rosenst. l. c. 347.

Hab. Raisha, in arboribus serpens, 1000 m. alt., III. 1914, Faurie, n. 202.

Polypodium hoozanense Hayata sp. nov. (Fig. 81–82). Rhizoma repens teres dense frondigerum apice dense squamatum. Stipes 2–3 cm. longus stramineus. Frons late linearis 15-20 cm. longa 2–3 cm. lata apice acuta vel obtusa basi longe attenuata ad stipitem decurrens margine integra vel plus minus undulata; textura crassiuscula supra viridis subtus pallidissima. Sori utroque latere costæ 1-seriatim prope costam dispositi rotundati 3–4 mm. in diametro a se 5–6 mm. distantes.

Fig. 81, *Polypodium hoozanense* Hayata.

Hab. Hoozan, prope Keitao, ad 5000 ped. alt., leg. B. Hayata, Aprili. 1916.

Near *P. infraplanicostale* Hayata, but differs from it in having quite obtuse fronds with much larger sori.

Polypodium Kawakamii Hayata Gen. Ind. p. 111.

Polypodium arisanense Rosenst. l.c. p. 347.

Hab. Arisan, ad arborum truncos, 2500 m. alt., V. 1914, U. Faurie, n. 472.

Fig. 82, *Polypodium hoozanense* Hayata ×$\frac{1}{3}$

Polypodium Morii HAYATA sp. nov. (Fig. 83–84). Rhizoma repens dense frondigerum dense squamatum. Stipes 4–8 cm. longus fulvo-rubescens basi plus minus squamatus. Frons lanceolata 25 cm. longa 3 cm. lata apice acuminatissima basi gradatim attenuata ad stipitem decurrens margine integra; textura chartacea in exsiccato fulvo-rubescens utraque pagine glabra. Sori utraque pagine 1-seriatim dispositi a costa 3–4 mm. a margine 10 mm. remoti rotundati 4–5 mm. in diametro a se 7–8 mm. remoti.

Fig. 83, *Polypodium Morii* HAYATA.

HAB. Toroku, Washakei, leg. U. MORI, 1908.

Near *P. infraplanicostale* HAY.; but differs from it in having much larger fronds of thinner texture and in the larger sori.

Polypodium megasorum C. CH.; HAYATA Gen. Ind. p. 112.

Polypodium raishaense ROSENST. l. c. p. 346.

HAB. Raisha, ad arborum truncos, 1200 m. alt., III. 1914, U. FAURIE, n. 219.—Bunkikiyo, 1500 m. alt., V. 1914, n. 481.

Polypodium pseudotrichomanoides HAYATA Gen. Ind. p. 112.

Polypodium pseudocucullatum ROSENST. l. c. p. 345.

HAB. in monte Arisan, 2500 m. alt., inter muscos, rarum, V. 1914, U. FAURIE, n. 471.

Polypodium remote-frondigerum HAYATA Gen. Ind. p. 112.

Fig. 84, *Polypodium Morii* HAYATA ×⅓

Polypodium loxogramme METT. var. *lamprocaulon* ROSENST. l. c. p. 347.

HAB. Arisan, 2500 m. alt., ad arbores, V. 1914, U. FAURIE, n. 464.

Polypodium shintenense HAYATA sp. nov. (Fig. 85–86). Rhizoma repens teres 5 mm. in diametro remote frondigerum adpresse squamatum. Stipes 25–30 cm. longus stramineus glaber nitidus erectus basi sparse squamatus. Frons simplex vel basi pinnati-loba; frondibus simplicibus lanceolatis 40–50 cm. longis 5–6 cm. latis apice acuminatis basi attenuato-decurrentibus margine

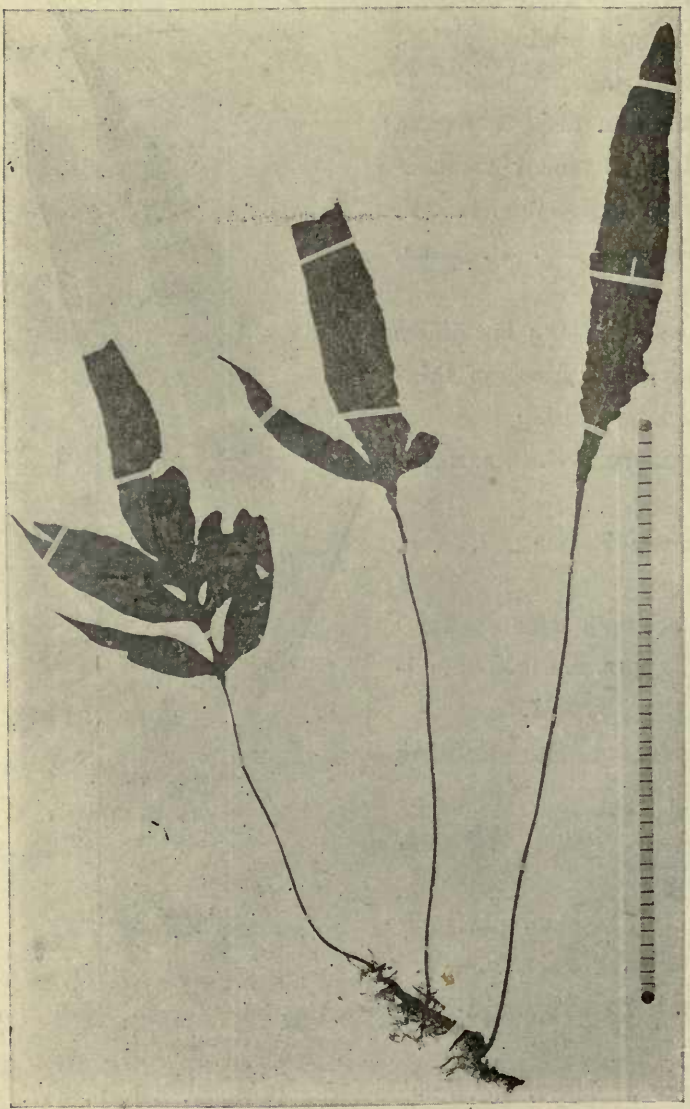

Fig. 85, *Polypodium shintenense* HAYATA ×$\frac{1}{5}$

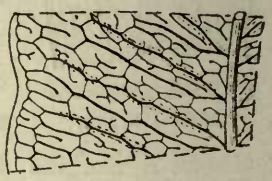

Fig. 86, *Polypodium shintenense* HAYATA.

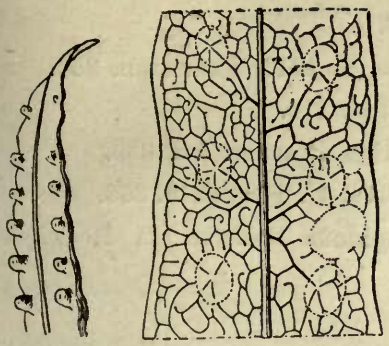

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Fig. 87, *Polypodium suishastagnale* HAYATA; 1. an apical portion of a pinna; 2, a portion of a frond.

subintegris vel obscure crenatis versus basin plus minus lobulatis; frondibus pinnatilobatis in ambitu ovatis, lobis vel segmentis inferioribus lanceolatis acuminatis basi ad rhachin decurrentibus margine subintegris. Sori utroque latere costæ 1-seriatim dispositi lineares $2\frac{1}{2}$ cm. longi a costa 2 mm. a margine 3–4 mm. distantes a se 7 mm. remoti.

Polypodium Wrightii (HK.) var. *lobatum* ROSENST. in Hedwigia Band 56, p. 347.

HAB. Shinten, leg. U. FAURIE, Juli. 1914, No. 215.

Near *P. Wrightii;* but differs from it in the much larger fronds which are more or less lobulate-pinnatifid towards the base.

It is regarded by ROSENSTOCK as a variety of *P. Wrightii.* But, as can be seen from the thinner texture, much larger lobulate form and different structure of the scales, it differs specifically from *P. Wrightii,* whose frond is of thicker texture, much maller and never lobate.

Polypodium suishastagnale HAYATA (Fig. 87–88) Gen. Ind. p. 113.

HAB. Suisha, leg. B. HAYATA, Aprili. 1916.

Polystichum ROTH. pt.

Polystichum arisanicum ROSENST. l. c. 339.

HAB. in monte Arisan, 2500 m. alt., V. 1914, U. FAURIE, n. 366.

Polystichum obtuso-auriculatum HAYATA Gen. Ind. p. 113.

Fig. 88, *Polypodium suishastagnale* HAYATA $\times\frac{1}{8}$

Polystichum formosanum Rosenst. l.c. 338.

Hab. Bunkikiyo, in rupibus, 2500 m. alt., V. 1914, Faurie, n. 363.

Polystichum prionolepis Hayata Gen. Ind. 114.

Polystichum lentum (Don.) Moore var. **gelida** Rosenst. l. c. 339.

Hab. in monte Arisan, 2500 m. alt., V. 1914, U. Faurie, n. 363.

Polystichum varium (L.) var. **eurylepidota** Rosenst. in Hedwigia Band 56, p. 340.

Pteris Linn.

Pteris quadriaurita Retz. var. **abbreviata** Rosenst. l.c. 333.

Kelung, in rupibus littoris, III. 1914, Faurie, n. 122.

Woodwardia Smith.

Woodwardia orientalis Sw. var. **formosana** Rosenst. l.c. 334.

Hab. Bankinsing, ad cataractas, II. 1914, U. Faurie, n. 231.

Lycopodiacæ.

Lycopodium Linn.

Lycopodium tereticaule Hayata Gen. Ind. p. 117.

Lycopodium Fauriei Rosenst. l.c. p. 348.

Hab. Arisan ex arboribus dependens, 2500 m. alt., V. 1914, U. Faurie, n. 492.

INDEX.

Orders in CAPITAL; *genera in* **Condensed**; *species in* romans; *synonyms and species incidentally mentioned in italics.*

PLATE I.

Explanation of Pl. I.

Stauntonia formosana HAYATA.

Fig. 1. A branch.
2. A leaflet.
3. A male raceme.
4. A male flower.
5. Stamens.
6, 7. A stamen seen from different sides.
8. A rudimentary ovary.
9. A petal.
10. A female flower.
11. Carpels.
12, 13. A carpel, seen from different sides.


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F. Hayami del.
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Yamana

PLATE II.

Explanation of Pl. II.

Camellia nokoensis HAYATA.

Fig. 1. A branch.

2. A flower.

3. A petal.

4, 5, 6. A stamen, seen from different sides.

7. An ovary with the style.

8. Basal portion of the same, in vertical section.

F. Hayami del.

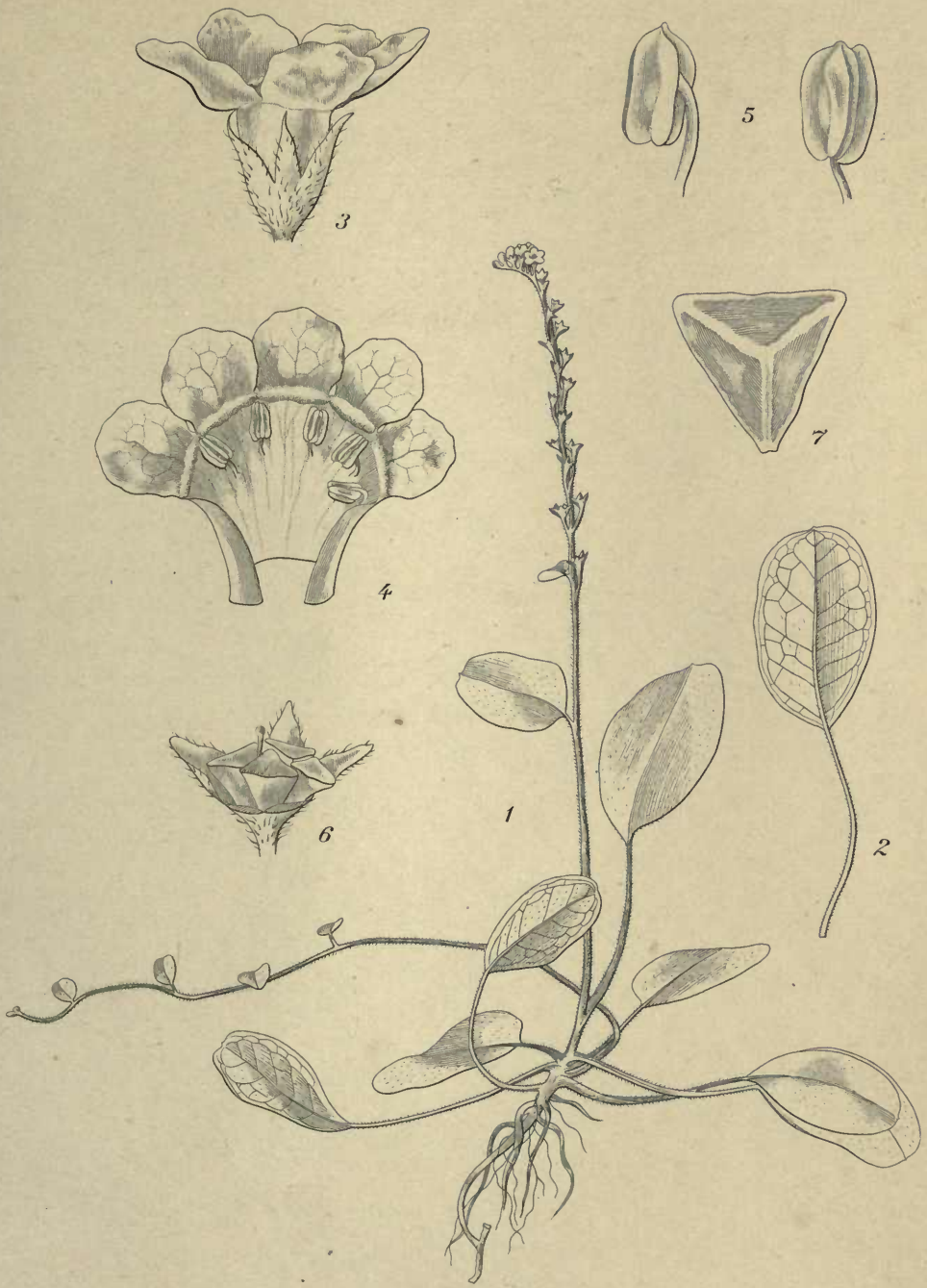
Yamanaka sculp.

PLATE III.

Explanation of Pl. III.

Trigonatis elevato-venosa HAYATA.

Fig. 1. The plant.
2. A leaf.
3. A flower.
4. Corolla, expanded.
5. Stamens.
6. A fruit.
7. An achene.



F. Hayami del.

Yamanaka sc

PLATE IV.

Explanation of Pl. IV.

Vernonia Kawakamii HAYATA.

Fig. 1. The plant.
2. A leaf, seen from above.
3. The same, seen from below.
4. A head.
5. A flower.
6, 7. A stamen, seen from different sides.
8. The style.
9. A pappus-hair.
10. A achene.
11. Cross section of the same.
12. A portion of the receptacle.

F. Hayami del.

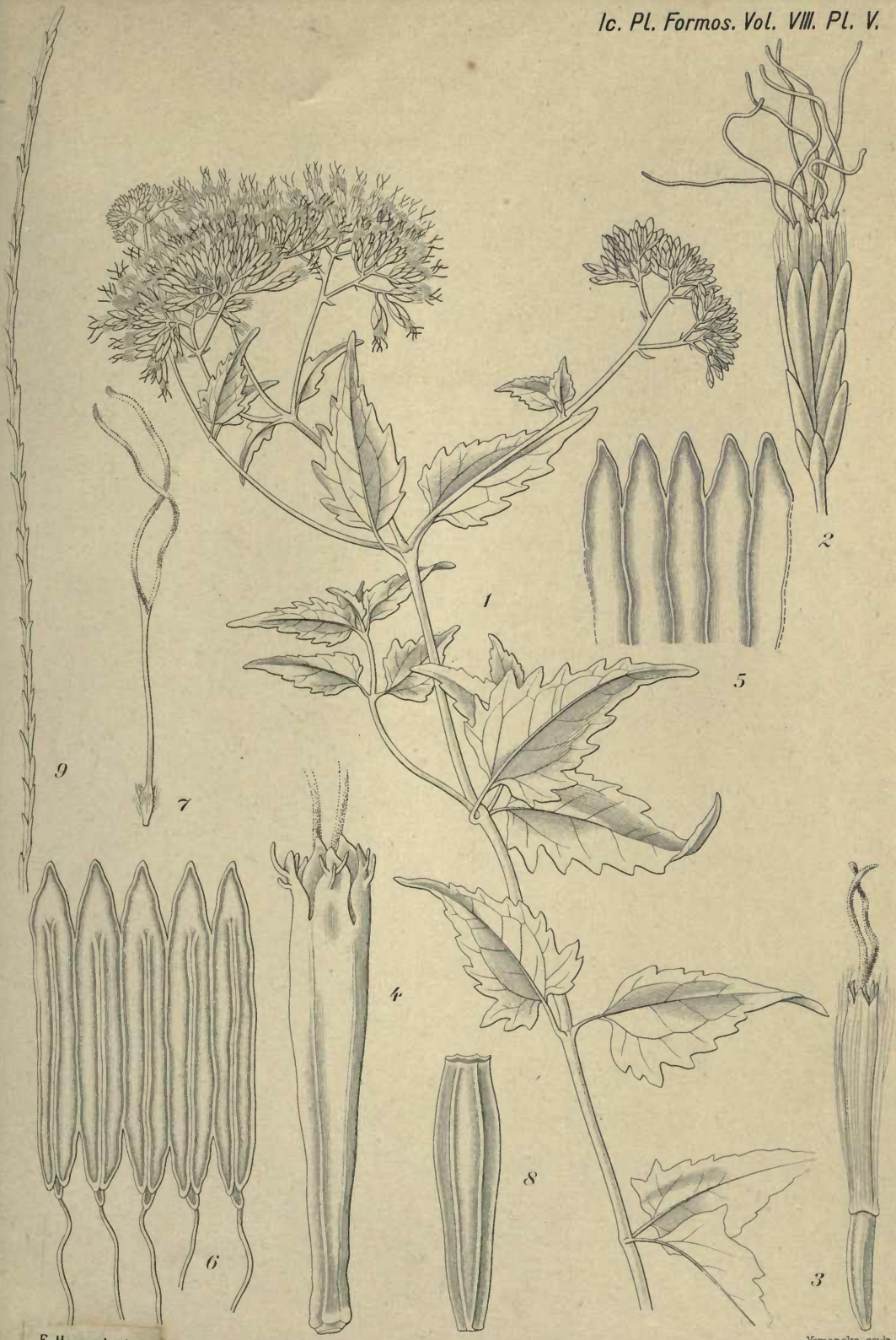
Yamanaka scul

PLATE V.

Explanation of Pl. V.

Eupatorium gracillimum HAYATA.

Fig. 1. A branch.
2. A head.
3. A flower.
4. Corolla.
5. An apical portion of the same corolla.
6. Stamens.
7. A style with the basal stylopodium.
8. A achene.
9. A pappus-hair.



F. Hayami del.

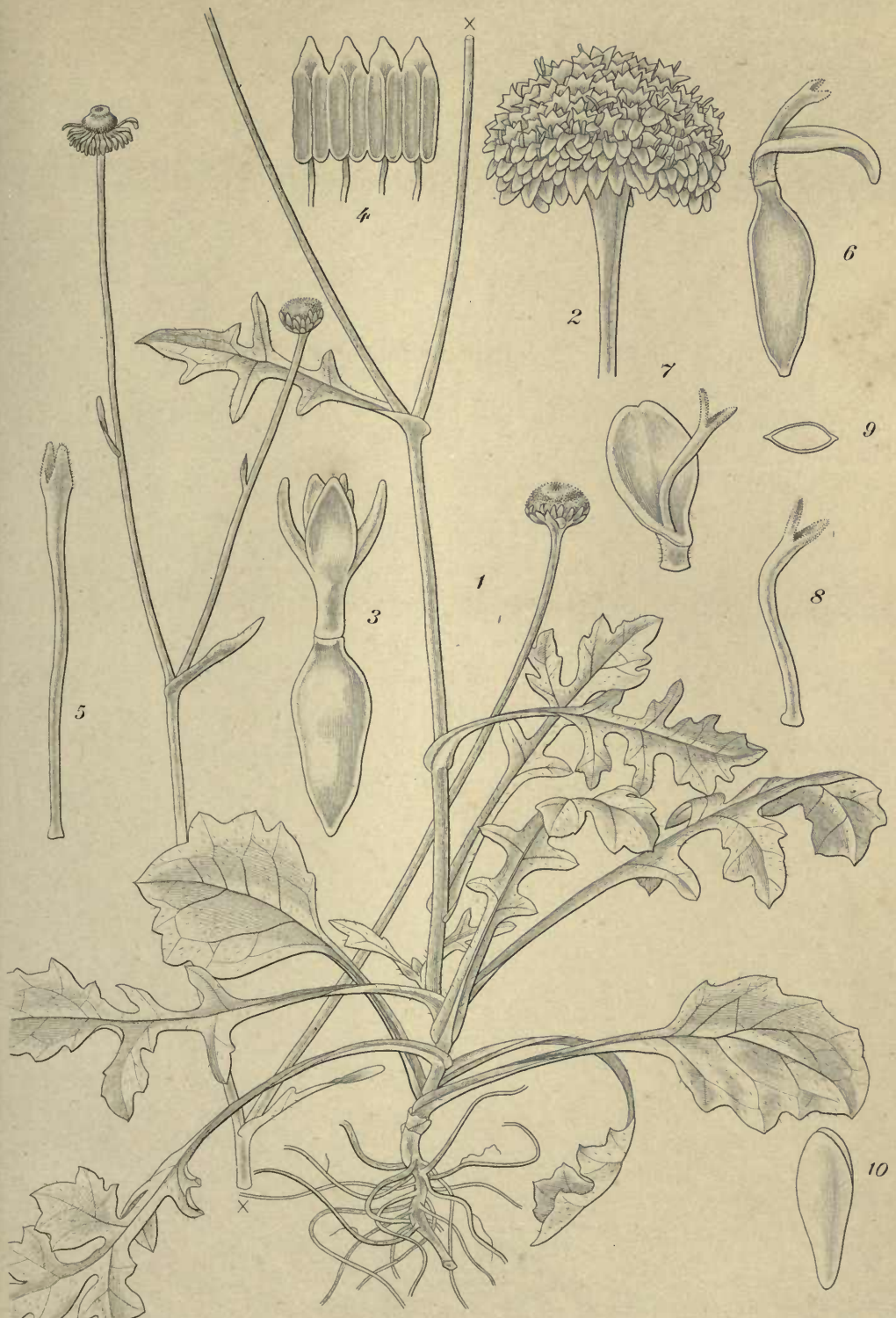
Yamanaka sculp.

PLATE VI.

Explanation of Pl. VI.

Myriactis longipedunculata HAYATA.

Fig. 1. The plant.
2. A head.
3. A disc-flower.
4. Stamens.
5. The style of a disc-flower.
6. A marginal flower.
7. The corolla and style of the same.
8. The style of the same.
9. Cross section of an achene.
10. An embryo.



F. Hayami del.

Yamanaka scul

PLATE VII.

Explanation of Pl. VII.

Sphæranthus suberiflorus HAYATA.

Fig. 1. The plant.
2. Compound head.
3. Vertical section of the same.
4. A single head.
5. A female flower.
6. A bisexual flower.
7. Stamens.

F. Hayami del.

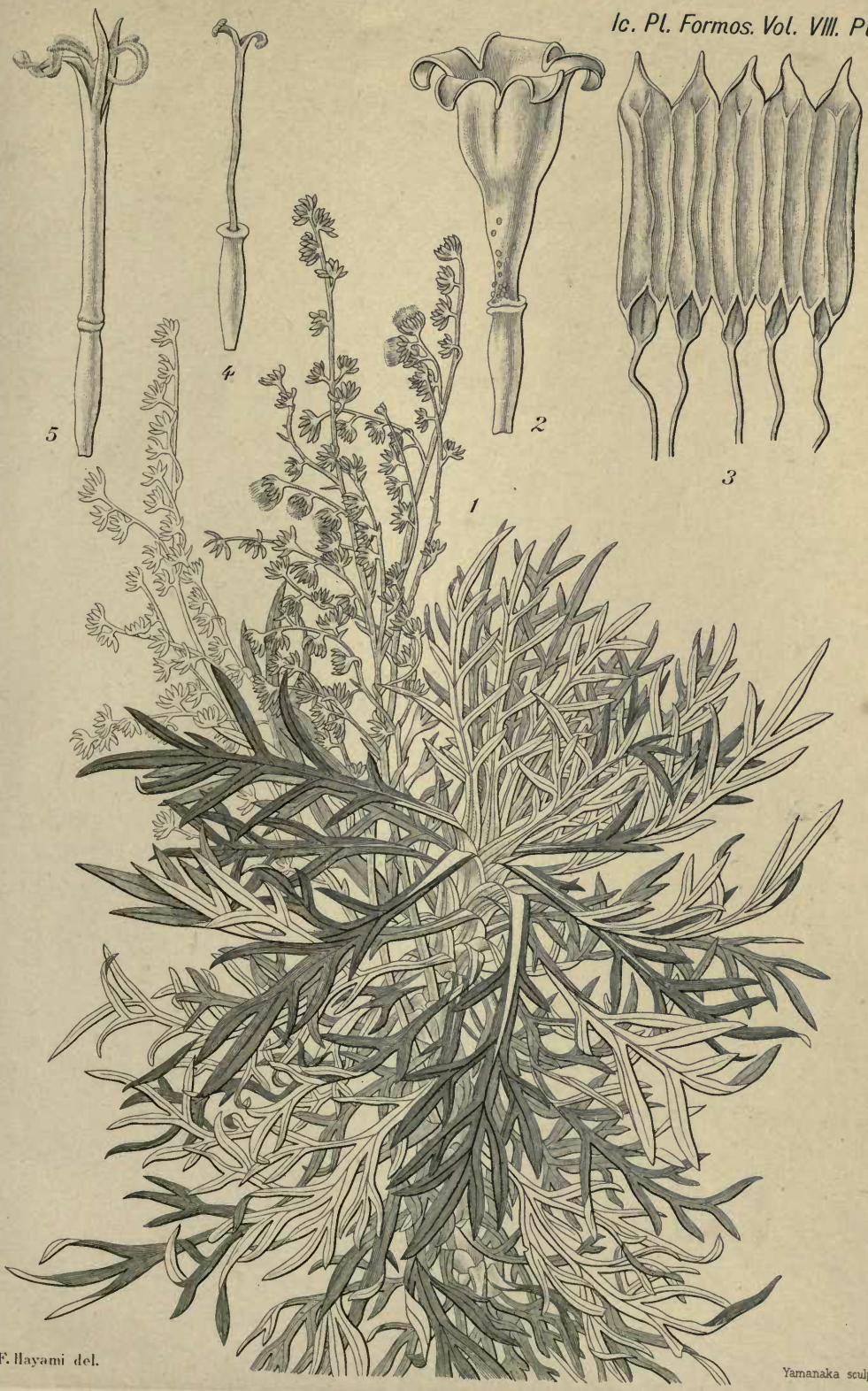
Yamanaka sculp.

PLATE VIII.

Explanation of Pl. VIII.

Artemisia Somai HAYATA.

Fig. 1. The plant.
2. A disc-flower.
3. Stamens.
4. The style and ovary of a disc flower.
5. A female flower.



F. Hayami del.

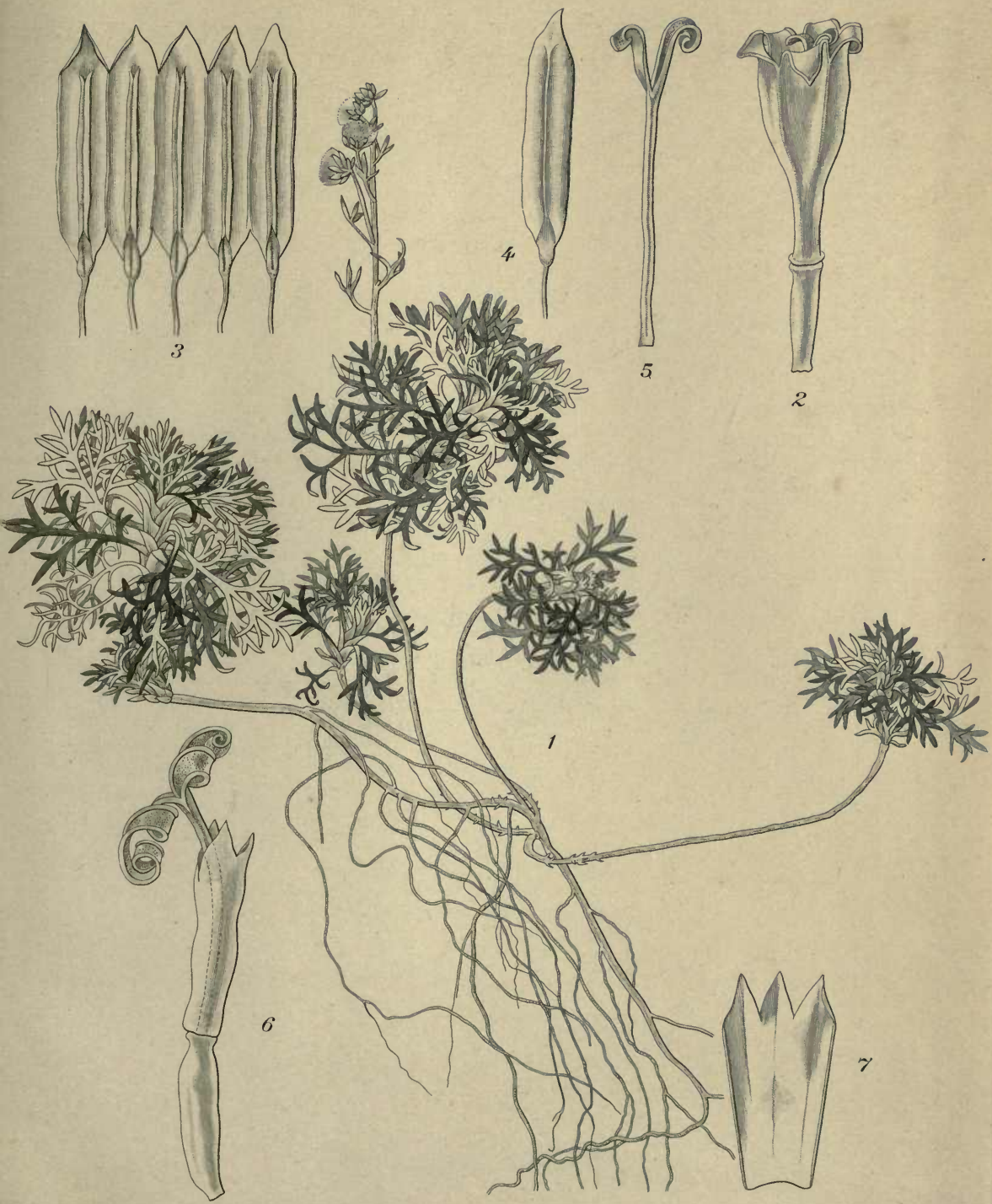
Yamanaka sculp.

PLATE IX.

Explanation of Pl. IX.

Artemisia Kawakamii HAYATA.

Fig. 1. The plant.
2. A disc-flower.
3. Stamens seen from within.
4. A stamens, seen from without.
5. The style of a disc-flower.
6. A female flower.
7. An apical portion of the corolla of a female flower.



F. Hayami del.

Yamanaka sculp.

PLATE X.

Explanation of Pl. X.

Ainslicea secundiflora HAYATA.

Fig. 1. The plant.
2. A head.
3. An outer scale.
4. An inner scale.
5. A flower.
6. Corolla, expanded.
7. Stamens.
8. A style with the basal stylopodium.
9. A pappus-hair.

F. Hayami del.

Yamanaka sculp.

PLATE XI.

Explanation of Pl. XI.

Ainsliœa asarifolia HAYATA.

Fig. 1. The plant.
2. A head.
3, 4. Outer and inner scales.
5. A flower, ovary taken off.
6. Corolla of the same flower, expanded.
7. Stamens.
8. The style.
9. An achene.
10. The same in section.
11. A seed.
12. A pappus-hair.

F. Hayami del.

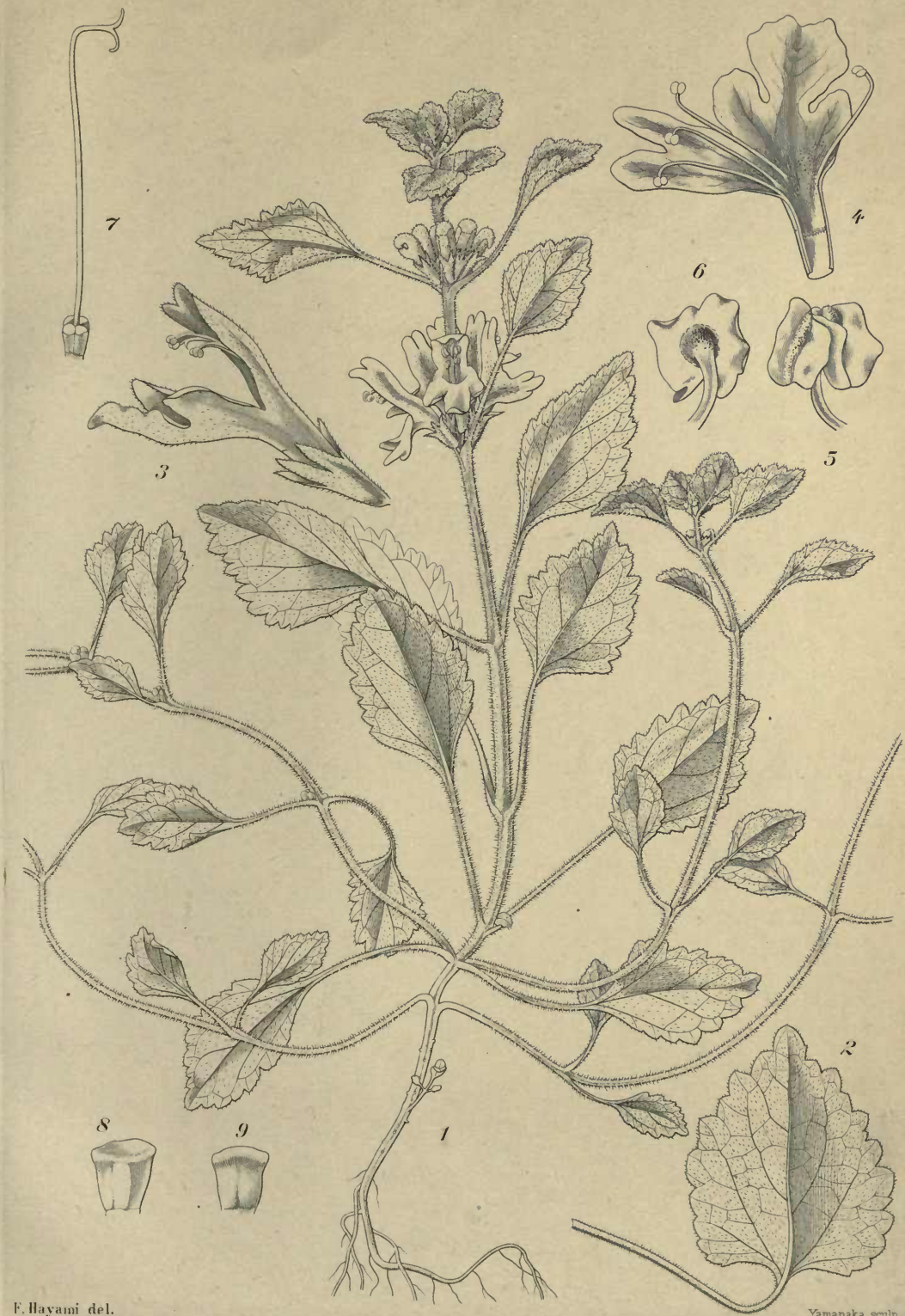
Yamanaka sculp

PLATE XII.

Explanation of Pl. XII.

Lamium kelungense HAYATA.

Fig. 1. The plant.
2. A leaf.
3. A flower.
4. Corolla, expanded.
5, 6. Stamens seen from different sides.
7. An ovary and style.
8, 9. Achenes, seen from different sides.



F. Hayami del.

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PLATE XIII.

Explanation of Pl. XIII.

Aristolochia Shimadai HAYATA.

Fig. 1. The plant.
2. Apical portion of a flower, before opening.
3. A mature flower, in vertical section.
4. Stamens and style.
5. A fruit.
6, 7. Seeds, seen from different sides.
8. Section of a seed.

F. Hayami del.

Yamanaka sculp.

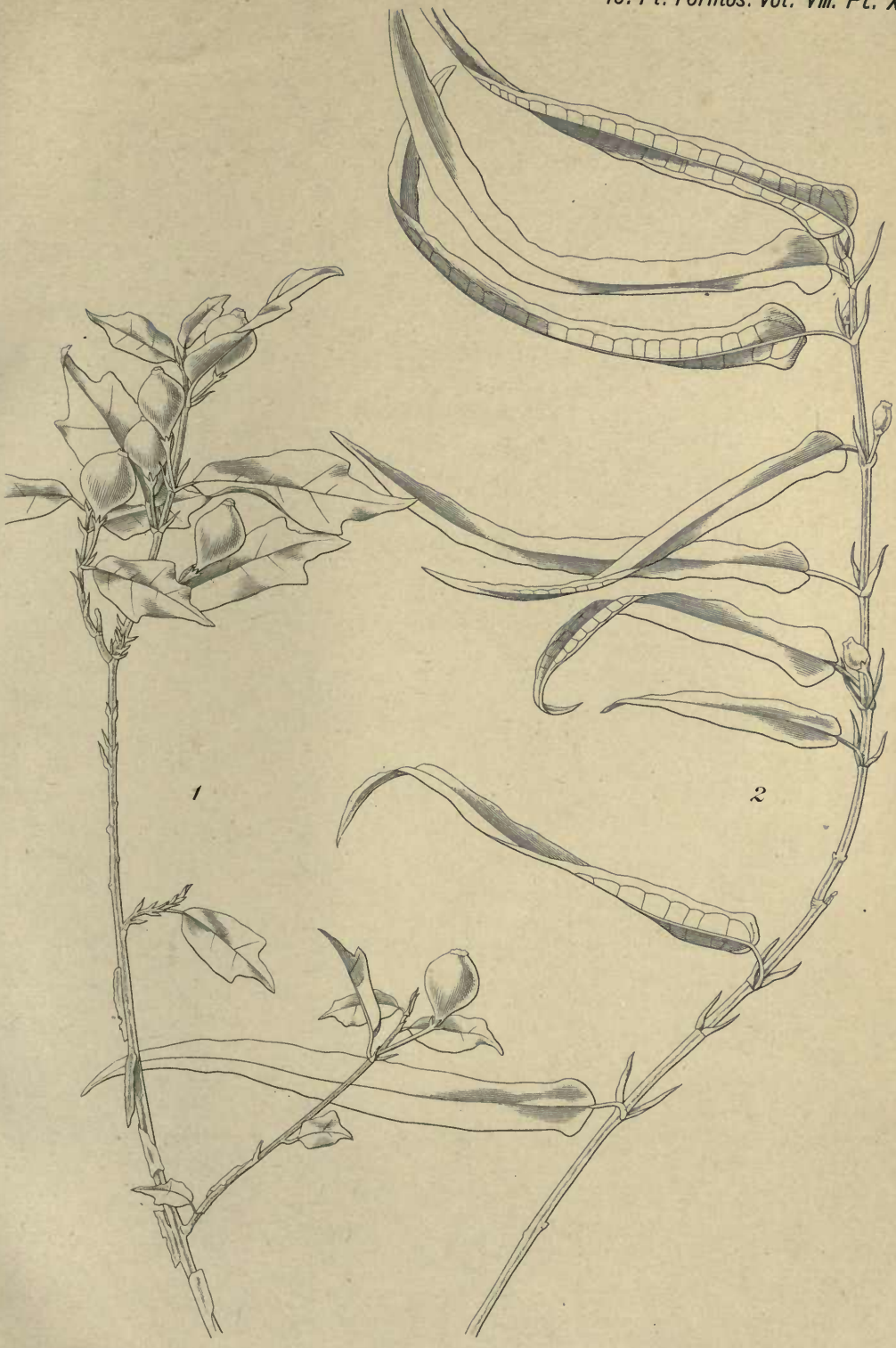
PLATE XIV.

Explanation of Pl. XIV.

Ficus tannoensis HAYATA.

(Analysis in the text.)

Fig. 1. A branch of *F. tannoensis* HAYATA form. *rhombifolia*.
2. A branch of *F. tannoensis* HAYATA form. *angustifolia*.



F. Hayami del.

Yamanaka sculp.

PLATE XV.

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